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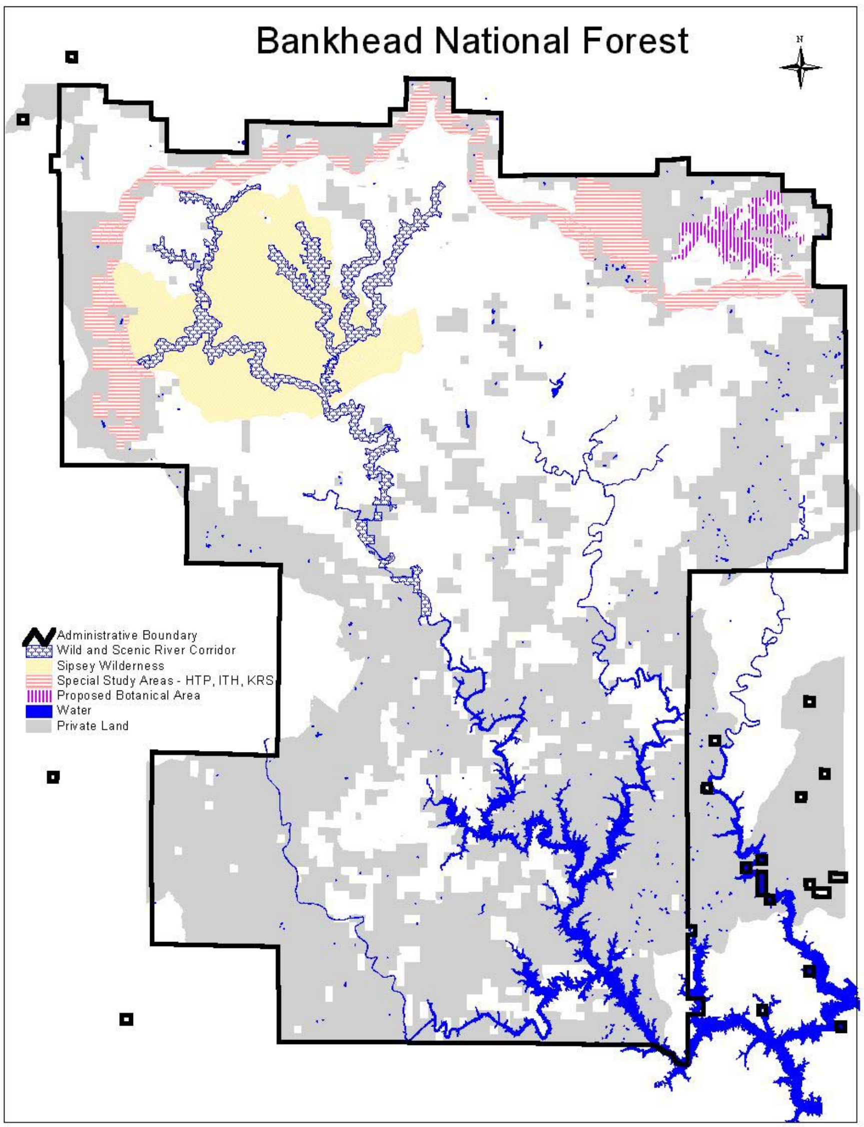
Final Environmental Impact Statement

Forest Health and Restoration Project

National Forests in Alabama, Bankhead National Forest
Franklin, Lawrence, and Winston Counties, Alabama



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Final
Environmental Impact Statement
Winston, Lawrence, and Franklin Counties, Alabama

Lead Agency: **USDA Forest Service, Bankhead National Forest**

Cooperating Agencies: **None**

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Abstract: The Bankhead National Forest proposes to determine the desired future conditions (DFC) of all existing loblolly pine stands on the District and implement a five-year schedule of work to emphasize forest health and restoration of Southern Pine Beetle (SPB) damaged stands. Proposed treatments include thinning of overstocked loblolly pine stands (9,452 acres) and reforesting SPB damaged stands (6,860 acres). These treatments would be the first step toward achieving the selected DFC. A range of 6 alternatives was considered and analyzed in detail:

- Alternative 1 - No Action
- Alternative 2 - Proposed Action
- Alternative 3 - Fewer treatment acres
- Alternative 4 - Fewer treatment acres and elimination of shortleaf pine DFC
- Alternative 5 - Fewer treatment acres and addition of oak woodland acres in Area 1 (Preferred Alternative)
- Alternative 6 - Fewer treatment acres accomplished by noncommercial means

The purpose of this project is:

1) To improve and maintain overall forest health.
2) To restore native upland hardwood forests and pine-oak woodlands.
3) To provide forest communities and plant and animal habitats that are uncommon on other lands in the Cumberland Plateau.

SUMMARY

The Alabama National Forest (now the northern portion of the Bankhead National Forest) was established in 1914 as a result of the Weeks Act, for the primary purpose of helping to protect the nation's watersheds and streams. During the early years, the emphasis of the Forest Service was land acquisition and custodial responsibilities. Beginning in the 1930s, the Civilian Conservation Corp provided the labor needed to reestablish forests on abandoned farmland and previously cutover land. The primary species used to reestablish forest conditions was loblolly pine. Beginning in the 1960s, the Forest Service initiated new efforts to improve forest economic yields by replacing some upland hardwood forests with faster growing loblolly pine. At the time, loblolly pine offered the best chance of high survival and success in reforestation. These efforts, along with some natural establishment of loblolly pine, have resulted in approximately 79,000 acres typed as loblolly pine on the Bankhead. While loblolly pine is a native tree species, the dominance of pure stands of loblolly pine is not typical of native landscapes of oak forests and fire dependent woodlands that occur in the uplands of the Cumberland Plateau.

The Bankhead National Forest is comprised of about 182,000 acres of public lands managed by the Forest Service. Of this, approximately 176,000 acres are currently forested and can be broadly classified as about 51% southern pines and 49% hardwoods.

Over the past decade, the Bankhead National Forest has been experiencing Southern Pine Beetle (SPB) infestations at epidemic levels, primarily in loblolly pine forests. The epidemic peaked in the summer of 2000 and continued at very high levels through 2001. An estimated 18,600 acres of pine forest have been killed by this epidemic. Most of the mortality occurred within the Sipsey Wilderness and other special areas where suppression efforts did not take place. The epidemic has resulted in large acres of standing dead trees that are a public safety hazard along trails/roads and these areas have increased forest fuel loads that escalate the risk of resource damaging wildfires in the future.

The purpose of this project is:

1) To improve and maintain overall forest health.
2) To restore native upland hardwood forests and pine-oak woodlands.
3) To provide forest communities and plant and animal habitats that are uncommon on other lands in the Cumberland Plateau.

This project would emphasize returning these loblolly pine stands and the damaged SPB sites to one of six native upland forest community types and would set the stage for attaining the long term Desired Future Conditions (DFC) for the forest. The six native upland forest community types are:

1) Dry-Mesic Oak Forests
2) Dry and Dry-Mesic Oak-Pine Forests
3) Dry and Xeric Oak Forests and Woodlands
4) Xeric Pine-Oak Forests and Woodlands
5) Xeric Shortleaf Pine/Bluestem Woodlands
6) Upland Longleaf Pine/Bluestem Woodlands

This action is needed because overstocking in loblolly pine stands has created unhealthy stand conditions that resulted in the SPB epidemic on the District. This situation has created the following concerns:

- Heavy fuel loading across the District, which increases the potential for resource damaging wildfires.
- Approximately 7,382 acres of SPB damaged areas that need to be restored.
- Approximately 18,143 acres of loblolly pine stands between the age of 15 and 45 years old with a potential need for thinning to reduce SPB risk.

Public involvement and scoping has been conducted for this analysis since 2000. The interdisciplinary team (ID team) conducted scoping to identify agency and public concerns and issues related to the proposed action. Complete scoping documentation is located in the project file at the Bankhead District Ranger Station in Double Springs. Following is a summary of this information.

1) Initial public involvement began at the public meetings the District holds quarterly with discussions about the need to treat the existing loblolly pine stands on the District to improve and maintain the health of these stands. These discussions continue to be a part of these regular public meetings.
2) This project was included in the Bankhead National Forest Schedule of Proposed Actions (SOPA) for scoping in the spring of 2002. These updates are mailed to the Bankhead National Forest's mailing list.
3) In the spring of 2002, a brochure entitled "Bankhead National Forest: Forest Health and Restoration Project" was distributed to the Bankhead National Forest's mailing list and to other interested individuals. This brochure explained the need for action and asked for input to the process.
4) The Notice of Intent (NOI) was published in the Federal Register on May 24, 2002. The NOI asked for public comment on the proposal from May 24 through July 6, 2002. In addition, letters were sent to the Bankhead National Forest's mailing list and information regarding the Notice of Intent was published in the *Northwest Alabamian* on May 25, 2002.

Using the comments from the public and other agencies, the interdisciplinary team developed a list of issues to address. The significant issues that were identified are as follows:

1) Establishment and maintenance of fire dependent understory species in oak woodland, longleaf woodland, and shortleaf woodland ecosystems.
2) Adversity of some portions of the public to artificial regeneration.
3) Impacts on recreational experiences and cultural values on the district.
4) Impacts from Annosum Root Rot (ARR) and Littleleaf Disease (LLD).
5) Early successional habitat (grass/forb and shrub/seedling/sapling associations) dispersed throughout the District.

These issues led the agency to develop alternatives to the proposed action including:

- Alternative 1 - make no DFC decisions and take no action to thin the loblolly stands or restore the SPB areas.
- Alternative 2 - (Proposed Alternative), thin approximately 18,143 acres and restore approximately 7,382 acres of SPB areas.
    - Area 1 - DFC of loblolly pine stands would be dry and xeric oak forests, dry-mesic oak, or dry and dry-mesic oak-pine forests.

  - Area 2 - DFC of loblolly pine stands would be xeric shortleaf pine/bluestem or xeric pine-oak forests and woodlands.
  - Area 3 - DFC of loblolly pine stands would be upland longleaf pine/bluestem or xeric pine-oak forests and woodlands.
- Alternative 3 - thin approximately 9,452 acres and restore approximately 6,860 acres of SPB areas.
  - Area 1 - DFC of loblolly pine stands would be dry and xeric oak forests, dry-mesic oak, or dry and dry-mesic oak-pine forests.
  - Area 2 - DFC of loblolly pine stands would be xeric shortleaf pine/bluestem or xeric pine-oak forests and woodlands (treatment on 3,445 acres) and dry and xeric oak forests and woodlands, dry-mesic oak, or dry and dry-mesic oak-pine forests (treatment on 1,744 acres).
  - Area 3 - DFC of loblolly pine stands would be upland longleaf pine/bluestem (treatment on 1,193 acres) or xeric pine-oak forests and woodlands (treatment on 1,484 acres).
- Alternative 4 - same treatments as Alternative 3 except DFC for loblolly pine stands in Area 2 would be dry and xeric oak forest, dry-mesic oak, or dry and dry-mesic oak-pine forests (shortleaf/bluestem would not be the DFC).
- Alternative 5 - (Preferred Alternative) same treatments as Alternative 3 except on 8,115 acres of Area 1 where dry and xeric oak woodlands would be the DFC.
- Alternative 6 - same treatments as Alternative 3 except all treatments would be accomplished by contract and commercial timber sales would be used only to remove merchantable materials after the treatment contracts are completed.

Loblolly pine stands become susceptible to SPB attack when they are allowed to become overstocked. Thinning these stands would increase their health and vigor and the risk of attack by SPB can be substantially reduced.

Areas heavily impacted by the SPB have vegetation which is primarily brush, including briars, hardwood sprouts and shrubs. Many of these stands will need intervention to aid in achieving the selected DFC. Shortleaf and longleaf pine with grassy understories would not become established in the currently existing conditions without site preparation and planting. In stands with a DFC of hardwood, oaks may need to be released from competition so that they can eventually make it into the overstory.

Although Alternative 1 does not propose any treatments, there is a projected increase in potential soil erosion based on previous SPB epidemics that require suppression activity. This type of activity would involve providing access for treatment through use of temporary roads, skid trails, and loading decks. Selection of Alternative 1 (No Action) has the potential for effects to the soil resource in the form of soil compaction and soil erosion comparable to Alternative 3, 5, and 6. Selecting one of the action alternatives (2-6) provides treatments to reduce/prevent SPB infestations that are projected to occur under Alternative 1. Cumulative effects to the soil resource from past SPB activity in 2001 and 2002 are expected to continue through 2004 and 2005. Cumulative effects from the use of site preparation burn and rolling drum chopper would extend the recovery time for soil erosion and soil compaction past the years 2007 and 2008.

No permanent roads or other permanent facilities are planned under any action alternative. Short-term soil loss is expected on temporary roads, areas of site preparation burn, and firelines. No long-term loss of soil productivity is expected.

Based on the finding of the cumulative effects analysis and the Watershed Condition Rank (WCR), all watersheds within the analysis area are in excellent condition and will remain as such no matter which alternative is selected. Over the cycle of the analysis period it was shown that watershed conditions would be improved by the selection of any alternative other than Alternative 1.

The greatest potential effects to aquatic species are within the Sipsey and Brushy watersheds due to the number of acres treated therein. The majority of the lands within these watersheds are under Forest Service ownership; therefore, there are minimal outside influences. Habitat loss, fragmentation, and modification are continual problems facing aquatic species. This project will maintain current habitat distribution that currently exist on Forest Service land and will not contribute to habitat loss, fragmentation or modification.

The practices of thinning, restoration to shortleaf pine, longleaf pine and hardwoods, along with future management actions of prescribed burning will facilitate development of quality wildlife habitat in the future.

This project proposes only a small increase in prescribed burning which is a minor source of particulate matter, and because there are no irreversible effects or irretrievable resource commitments, there is little risk of affecting regional health or haze issues.

The amount and arrangement of the mixed mesophytic forest, which provides habitat for forest riparian, mixed mesic forest, mid- and late-successional deciduous forest and area sensitive mid- and late- successional deciduous forest associates, will not be affected by any of the action alternatives.

The primary difference in the various alternatives concerns the best assortment/arrangement of long-term habitat and maintenance for the selected species. There is a difference between the DFC's of the alternatives. The primary difference among the alternatives is the level of diversity and representation of grass and forb, fire-dependent habitats across the landscape.

The landscape character of the District is natural appearing with a few acres of rural forested land in the developed recreation areas. Thinning will result in natural appearing land staying natural appearing, and rural forested land staying rural forested of course with a few less trees. Restoration work will force the SPB spots to move into a rational recovery mode immediately, which will speed the change to a healthy forest. Allowing the SPB spots to recover through natural processes would take much longer than if the areas are treated as proposed.

All the action alternatives are designed to improve the ecological health of the Bankhead National Forest; therefore, all the action alternatives should result in better visual settings.

The following tables compare the alternatives using different criteria.

Comparison of Treatments and Acres.

ALT.	Area 1 THIN ACRES	Area 1 SPB ACRES	Area 2 THIN ACRES	Area 2 SPB ACRES	Area 3 THIN ACRES	Area 3 SPB ACRES	Site Preparation	Planting	Anticipated Prescribed Fire
1	0	0	0	0	0	0	none		
2	11,102	4,669					HT, PF, or NT	none	10 years
			4,233	1,928			DC and PF	shortleaf pine	2 - 5 years
					2,808	785	DC and PF	longleaf pine	2 - 5 years
3 & 6	4,092	4,354					HT, PF, or NT	none	10 years
			2,422	1,023			DC and PF	shortleaf pine	2 - 5 years
			972	772			HT, PF, or NT	none	
		Total->	***3,394***	***1,795***					
					1,025	168	DC and PF	longleaf pine	2 - 5 years
					941	543	HT, PF, or NT	none	
				Total->	***1,966***	***711***			
4	3,978	4,354					HT, PF, or NT	none	10 years
			0	0			DC and PF		
			2,683	1,795			HT, PF, or NT	none	10 years
		Total->	***2,683***	***1,795***					
					1,025	168	DC and PF	longleaf pine	2 - 5 years
					941	543	HT, PF, or NT	none	
				Total->	***1,966***	***711***			
5	4,092	4,354					HT, PF, or NT	none	2-5&10 years*
			2,422	1,023			DC and PF	shortleaf pine	2 - 5 years
			972	772			HT, PF, or NT	none	
		Total->	***3,394***	***1,795***					
					1,025	168	DC and PF	longleaf pine	2 - 5 years
					941	543	HT, PF, or NT	none	
				Total->	***1,966***	***711***			

* 8,115 acres woodland conditions -- 1,045 acres in treatment stands

HT = handtools PF = prescribed fire DC = roller drum chop (or new methods as available) NT = no treatment

Comparison of Desired Future Conditions for Treatment Areas

ALT.	Area	Desired Future Conditions: Upland HDWD HDWD-Pine *	Dry and Xeric Oak Woodlands	Shortleaf/Bluestem Woodlands	Longleaf/Bluestem Woodlands
1			0	0	0
2	Area 1	15,771			
	Area 2			6,161	
	Area 3				3,593
	Total->	***15,771***		***6,161***	***3,593***
3	Area 1	8,446			
	Area 2	1,636	108	3,445	
	Area 3	1,432	52		1,193
	Total->	***11,514***	***160***	***3,445***	***1,193***
4	Area 1	8,332			
	Area 2	4,478			
	Area 3	1,432	52		1,193
	Total->	***14,242***	***52***	***0***	***1,193***
5	Area 1	7,401	1,045		
	Area 2	1,636	108	3,445	
	Area 3	1,432	52		1,193
	Total->	***10,469***	***1,205***	***3,445***	***1,193***
6	Area 1	8,446			
	Area 2	1,636	108	3,445	
	Area 3	1,432	52		1,193
	Total->	***11,514***	***160***	***3,445***	***1,193***

* This includes: Dry-Mesic Oak Forests, Dry and Dry-Mesic Oak-Pine Forests, and Dry and Xeric Oak Forests.

Comparison of Issues.

Issue 1. Establish and maintain fire dependent understory species in oak woodland, longleaf woodland, and shortleaf woodland ecosystems.			
Alternative 1	Alternative 2	Alternatives 3, 5, &6	Alternative 4
No treatment, no woodland conditions would be created.	Creates most acres of woodland conditions, but they are all located in Areas 2 and 3	Alts. 3 & 6 also create woodland acres in only Areas 2 and 3. Alt. 5 designates additional acres of woodlands in Area 1. Alt. 5 has best distribution of woodland acres.	Creates least amount of woodland acres and all is located in Area 3.
Issue 2. Amount of artificial regeneration.			
Alternative 1	Alternative 2	Alternatives 3, 5, &6	Alternative 4
None	Proposes 2713 acres (most of all alts.)	Proposes 1,191 acres of planting	Proposes 168 acres of planting (least of all alts.)
Issue 3. Impacts on recreational experiences and cultural values.			
Alternative 1	Alternative 2	Alternatives 3, 5, &6	Alternative 4
Would not reduce the risk of SPB and would continue to cause access and safety problems for forest visitors due to dead trees.	Would reduce SPB risk. Would thin stands in cultural areas (some user impact). Would treat stands adjacent to and near trails and forest camps (some user impact).	Would reduce SPB risk. Would *not* treat stands in cultural areas. Would treat stands adjacent to and near trails and forest camps (some user impact).	Would reduce SPB risk. Would *not* treat stands in cultural areas. Would treat stands adjacent to and near trails and forest camps (some user impact).
Issue 4. Impacts from Annosum Root Rot (ARR) and Littleleaf Disease (LLD).			
Alternative 1	Alternative 2	Alternatives 3, 5, &6	Alternative 4
No risk of ARR from thinning. Some risk in SPB Control. Risk of LLD is slight.	Potential risk of ARR from thinning. Can be mitigated. Risk of LLD slight, can be mitigated.	Fewer thinning acres than Alternative 2. Some risk, can be mitigated. Risk of LLD slight, can be mitigated	Fewer thinning acres than Alternative 3,5,or6. Some risk, can be mitigated. Risk of LLD slight, can be mitigated

Issue 5. Early successional habitat dispersed throughout the forest.			
Alternative 1	Alternative 2	Alternatives 3, 5, &6	Alternative 4
None	Would create the most early successional habitat (woodlands), but it would all be in Areas 2 and 3.	Alts. 3 and 6 would create early successional habitat (woodlands), but it would all be in Areas 2 and 3. Alt. 5 would add woodland acres in Area 1. Alt. 5 would provide the most distribution of this type habitat.	Would create the least early successional habitat and they would occur only in Area 3.

The District Ranger of the Bankhead National Forest is the public official responsible for deciding, based upon this analysis, what actions will be taken to meet the purpose of and need for action. The decision to be made is to decide what the DFC's for the forest should be and to what extent, if any, to implement the proposed treatments.

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CHAPTER 1. PURPOSE OF AND NEED FOR ACTION

Brief History of Bankhead National Forest

The Bankhead National Forest is in a unique position to implement natural resource management actions aimed at sustaining a representation of nine (9) forest community types that are native to the Southern Cumberland Plateau physiographic region. Emphasis would be placed on maintaining forest and plant community types not abundant on private lands. These communities include fire dependent upland pine/bluestem and oak woodland ecosystems, mid- to late-successional deciduous forests (including cove hardwood/eastern hemlock forests), old-growth representation of all nine (9) forest community types, and eight (8) rare plant community types.

After the ice age receded approximately 10,000 years ago, the composition of deciduous and pine forests in eastern North America prior to European settlement was largely influenced by climate, natural events (both large-scale and small-scale) and the use of fire by Native Americans. There is increasing evidence that humans actively used woodland fires on a regular basis for a variety of reasons and the forests European settlers first encountered were a result of regular occurrence of fire. This included both upland hardwood forests/woodlands and pine woodlands.

Over the last 100-200 years, fire has been effectively excluded from forests throughout the southern Cumberland Plateau, including the area that is now the Bankhead National Forest. Without fire, the range of native fire, dependent forest communities have not been maintained and are now very uncommon across the North Alabama landscape. These communities include the shortleaf/bluestem woodlands, xeric (very dry) oak-pine woodlands, dry and xeric oak forest and woodlands, and the northern extent of longleaf/bluestem woodlands. The absence of fire, in combination with major land use changes, has also resulted in a decline of native grassland and shrub conditions that should be common in some of the upland forests. In turn, a decline in native plant and animal diversity across the region has occurred.

The Alabama National Forest (now the northern portion of the Bankhead National Forest) was established in 1914 as a result of the Weeks Act, for the primary purpose of helping to protect the nations watersheds and streams. During the early years the emphasis of the Forest Service was land acquisition and custodial responsibilities. Beginning in the 1930s, the Civilian Conservation Corp provided the labor needed to reestablish forests on abandoned farmland and previously cutover land mostly in the uplands. The primary species used to reestablish forest conditions was loblolly pine. Beginning in the 1960s, the Forest Service initiated new efforts to improve forest economic yields by replacing some upland hardwood forests with faster growing loblolly pine. At the time, loblolly pine offered the best chance of high survival and success in reforestation. These efforts, along with some natural establishment of loblolly pine, have resulted in approximately 79,000 acres typed as loblolly pine on the Bankhead. While loblolly pine is a native tree species, the dominance of pure stands of loblolly pine, is not typical of native, landscapes of oak forests and fire dependent woodlands occurring in the uplands of the Cumberland Plateau.

Purpose and Need for Action

The Bankhead National Forest is comprised of about 182,000 acres of public lands managed by the Forest Service. Of this, approximately 176,000 acres are currently forested and can be broadly classified as about 51% southern pines and 49% hardwoods.

Over the past decade, the Bankhead National Forest has been experiencing Southern Pine Beetle (SPB) infestations at epidemic levels, primarily in loblolly pine forests. The epidemic peaked in the summer of 2000 and continued at very high levels through 2001. An estimated 18,600 acres of pine forest have been killed by this epidemic. Most of the mortality occurred within the Sipsey Wilderness and other special areas where suppression efforts did not take place. The epidemic has resulted in large acres of standing dead trees that are a public safety hazard along trails/roads and these areas have increased forest fuel loads that escalate the risk of resource damaging wildfires in the future.

Southern Pine Beetle Spot

Of the remaining loblolly pine acres, approximately 18,000 acres are between the age of 15 and 45 years old with a potential need for intermediate thinning due to unhealthy stand conditions caused by overstocking.

Overstocked Loblolly Pine Stand

The purpose of this project is:

1) To improve and maintain overall forest health.
2) To restore native upland hardwood forests and pine-oak woodlands.
3) To provide forest communities and plant and animal habitats that are uncommon on other lands in the Cumberland Plateau.

This project would emphasize returning these loblolly pine stands and the damaged SPB sites to one of six native upland forest community types and would set the stage for attaining the long term Desired Future Conditions (DFC) for the forest. The six native upland forest community types are:

1) Dry-Mesic Oak Forests
2) Dry and Dry-Mesic Oak-Pine Forests
3) Dry and Xeric Oak Forests and Woodlands
4) Xeric Pine-Oak Forests and Woodlands
5) Xeric Shortleaf Pine/Bluestem Woodlands
6) Upland Longleaf Pine/Bluestem Woodlands

This action is needed because overstocking in loblolly pine stands has created unhealthy stand conditions that resulted in the SPB epidemic on the district. This situation has created the following concerns:

- Heavy fuel loading across the district, which increases the potential for resource damaging wildfires.

- Approximately 7,382 acres of SPB damaged areas that need to be restored.
- Approximately 18,143 acres of loblolly pine stands between the age of 15 and 45 years old with a potential need for thinning to reduce SPB risk.

Proposed Action

The Bankhead National Forest proposes to determine the desired future conditions (DFC) of all existing loblolly pine stands on the district and to implement a five-year schedule of work to emphasize forest health and restoration. Proposed actions include thinning of overstocked loblolly pine stands and reforesting SPB damaged stands. Emphasis would be placed on six native upland forest community types, including all associated plant and wildlife species, on the Bankhead National Forest located in Winston, Lawrence, and Franklin Counties, Alabama.

The proposed action would focus on:

- Areas that are currently occupied by loblolly pine stands that are between the ages of 15 and 45 years old.
- Areas 10 acres and larger that have been killed by SPB infestations.

The proposed action addresses the need to improve and maintain healthy forest conditions and to provide forest communities and plant and animal habitats that are uncommon on other lands in the Cumberland Plateau. The proposed action includes:

- Intermediate thinning on approximately 18,143 acres of loblolly pine stands.
- Silvicultural site preparation of SPB impacted areas to better insure successful reforestation efforts.
- Natural and artificial reforestation to restore SPB impacted areas on approximately 7,382 acres killed by SPB.

Area 1

Treatments would include intermediate thinning of approximately 11,102 acres of loblolly pine forest, natural reforestation and associated site preparation on approximately 4,669 acres impacted by SPB. The desired future conditions (DFC) of the loblolly pine stands in this area are:

- Dry and Xeric Oak Forests
- Dry and Dry-Mesic Oak and Oak-Pine Forests

Thinning would reduce short-term risks to SPB infestations and reduce future forest fuel buildups. This thinning would reduce basal area to between 70 to 85 square feet per acre and would be accomplished with commercial timber sales. Trees favored for retention in order of priority in these areas would include:

- dominant hardwood trees
- codominant hardwood trees
- dominant/codominant pine

The favored hardwood species would include a variety of oak and hickory species. The top priority stands for thinning would be those between 15-45 years old, with high tree densities. It is proposed that all timber sale harvest options would be available for this project.

The thinning would allow for the development of young oak, hickory, and other associated hardwood species in the understory that are somewhat intolerant of shade. This thinning would be the first phase of a long-term commitment (30-90 years) that would gradually replace these existing loblolly pine stands with dry and xeric oak forests, or dry-mesic oak and oak-pine forests. In some cases, this thinning would actually shift the stand condition from a predominantly pine stand to a predominately hardwood stand condition.

Site preparation for natural regeneration on restoration sites would consist of hand tools and prescribed fire, hand tools alone, prescribed fire alone, or no treatment. These treatments would be used to restore these sites to dry and xeric oak forests, or dry-mesic oak and oak-pine forests.

It is anticipated that prescribed fire would occur on parts of this area approximately once every ten years to reduce forest fuel build up.

Area 2

Treatments would include intermediate thinning of approximately 4,233 acres of loblolly pine forest, artificial reforestation and associated site preparation on approximately 1,928 acres impacted by SPB. The DFC's of the loblolly pine stands in this area are:

- Xeric Shortleaf/Bluestem Woodland Communities
- Xeric Pine-Oak Forest and Woodland Communities

Thinning would reduce short-term risks to SPB infestations and reduce future forest fuel buildups. This thinning would reduce the basal area to between 50 to 65 square feet per acre. Trees favored for retention in order of priority in these areas would include:

- shortleaf pine
- longleaf pine
- loblolly pine
- dominant/codominant oaks/hickory

The top priority stands for thinning would be those between 15-45 years old, with high tree densities. It is proposed that all timber sale harvest options would be available for this project.

The thinning would allow for the development of understory, fire-dependent grasses and shrubs that are intolerant of shade. This thinning would be the first phase of a long-term commitment that would gradually replace these existing loblolly pine stands with shortleaf pine as the predominant overstory species, and bluestem grass association as the predominant understory.

Site preparation on restoration sites would consist of roller drum chopping and prescribed fire, followed by the planting of shortleaf pine seedlings. These treatments would begin the process of restoring these sites to shortleaf/bluestem woodlands.

It is anticipated that prescribed fire would occur on parts of this area 2 or 3 times per decade to reduce forest fuel build up, create open woodland conditions, and enhance wildlife habitat.

Area 3

Treatments would include intermediate thinning of approximately 2,808 acres of loblolly pine forest, artificial reforestation and associated site preparation on approximately 785 acres impacted by SPB. The DFC's of the loblolly pine stands in this area are

- Upland Longleaf/Bluestem Woodland Communities
- Xeric Pine-Oak Forest and Woodland Communities

Thinning would reduce short-term risks to SPB infestations and reduce future forest fuel buildups. This thinning would reduce the basal area to between 50 to 65 square feet per acre. Trees favored for retention in order of priority in these areas would include:

- longleaf pine
- shortleaf pine
- loblolly pine
- dominant/codominant oaks/hickory

The top priority stands for thinning would be those between 15-45 years old, with high tree densities. It is proposed that all timber sale harvest options would be available for this project.

The thinning would allow for the development of understory, fire-dependent grasses and shrubs that are intolerant of shade. This thinning would be the first phase of a long-term commitment that would gradually replace these existing loblolly pine stands with longleaf pine as the predominant overstory species, and bluestem grass association as the predominant understory.

Site preparation on these sites would consist of roller drum chopping and prescribed fire, followed by planting of longleaf pine seedlings. These treatments would begin the process of restoring these sites to longleaf/bluestem woodlands.

It is anticipated that prescribed fire would occur on parts of this area 2 or 3 times per decade to reduce forest fuel build up, create open woodland conditions, and enhance wildlife habitat.

A complete listing of the areas proposed for treatment and the treatment proposed for each is located in the Appendix of this document. These treatments would occur over the next five years.

The acreage specified in this Proposed Action is derived from the Geographic Information System (GIS) for the Bankhead National Forest. Although this acreage differs from that which was given in prior descriptions of the Proposed Action (Notice of Intent, corresponding scoping material, etc.), the actions are the same and the areas to be treated and treatment methods proposed remain the same.

If a decision is made to implement the Proposed Action or one of the action alternatives, acreage descriptions for this project will continue to be refined as better mapping is achieved on the ground. GIS information will continue to improve, as stand boundaries are refined to better reflect actual conditions on the ground and better mapping techniques such as global positioning systems (GPS) are used and incorporated into GIS. Areas of inclusions and streamside zones will be subtracted from a stand's acreage to determine actual acres to be treated.

Existing State, County and Forest Service system roads access areas proposed for treatment. No new Forest Service roads would be constructed to facilitate proposed treatments except for rights of way that may be needed across private lands to access some treatment areas.

Decision To Be Made

The District Ranger of the Bankhead National Forest is the public official responsible for deciding, based upon this analysis, what actions will be taken to meet the purpose of and need for action. The decision to be made is to what extent, if any, to implement the proposed treatments and to decide what the DFC's for the forest should be. The options include, in whole or in part, the alternatives that have undergone analysis:

- Alternative 1 – make no DFC decisions and take no action to thin the loblolly stands or restore the SPB areas.
- Alternative 2 – as proposed, thin approximately 18,143 acres and restore approximately 7,382 acres of SPB areas.

    - Area 1 – DFC of loblolly pine stands would be dry and xeric oak forests, dry-mesic oak, or dry and dry-mesic oak-pine forests.
    - Area 2 – DFC of loblolly pine stands would be xeric shortleaf pine/bluestem or xeric pine-oak forests and woodlands.
    - Area 3 – DFC of loblolly pine stands would be upland longleaf pine/bluestem or xeric pine-oak forests and woodlands.
- Alternative 3 - thin approximately 9,452 acres and restore approximately 6,860 acres of SPB areas.
    - Area 1 – DFC of loblolly pine stands would be dry and xeric oak forests, dry-mesic oak, or dry and dry-mesic oak-pine forests.
    - Area 2 – DFC of loblolly pine stands would be xeric shortleaf pine/bluestem or xeric pine-oak forests and woodlands (treatment on 3,445 acres) and dry and xeric oak forests and woodlands, dry-mesic oak, or dry and dry-mesic oak-pine forests (treatment on 1,636 acres).
    - Area 3 – DFC of loblolly pine stands would be upland longleaf pine/bluestem (treatment on 1,193 acres) or xeric pine-oak forests and woodlands (treatment on 1,484 acres).
- Alternative 4 – same treatments as Alternative 3 except DFC for loblolly pine stands in Area 2 would be dry and xeric oak forest, dry-mesic oak, or dry and dry-mesic oak-pine forests (shortleaf/bluestem would not be the DFC).
- Alternative 5 – same treatments as Alternative 3 except on 8,115 acres of Area 1 dry and xeric oak woodlands would be the DFC.
- Alternative 6 – same treatments as Alternative 3 except all treatments would be accomplished by contract and commercial timber sales would be used only to remove merchantable materials after the treatment contracts are completed.

Treatments proposed were prioritized and incorporated into a tentative implementation schedule for the purpose of this analysis (see Appendix). This schedule was designed to refine the analysis and to be used as a planning tool. A variety of factors (funding, workforce availability, etc.) will require flexibility in implementation of the proposed actions. The actual year to implement a given treatment is not part of the decision to be made at this time. The decision to be made is what treatments, if any, should be implemented over the next five years.

Prescribed fire is recognized as an important part of establishing and maintaining one or more of the proposed forest conditions, therefore analysis of the impacts of prescribed fire is included in this document. However, prescribed fire rotations, specific burn areas, or type of prescribed fires is not part of the decision to be made at this time.

If a forthcoming decision includes longleaf and/or shortleaf planting, the need for additional measures to insure seedling survival can be assumed. One to three years after planting, longleaf or shortleaf seedlings often require release from competition. If release is needed, based on site-specific needs at that time, a proposal will be developed and site-specific analysis conducted prior to treatment in this project area. However, foreseeable release actions are not part of the decision to be made at this time.

Public Involvement

A variety of public involvement and scoping has been conducted for this analysis since 2000. The interdisciplinary team (ID team) conducted scoping to identify agency and public concerns and issues related to the proposed action. Complete scoping documentation is located in the project file at the Bankhead District Ranger Station in Double Springs. Following is a summary of this information.

1) Initial public involvement began at the quarterly public meetings the district holds with discussions about the need to treat the existing loblolly pine stands on the district to improve and maintain the health of these stands. These discussions continue to be a part of these regular public meetings.
2) This project was included in the Bankhead National Forest Schedule of Proposed Actions (SOPA) for scoping in the spring of 2002. These updates are mailed to the Bankhead National Forest's mailing list.
3) In the spring of 2002, a brochure entitled "Bankhead National Forest: Forest Health and Restoration Project" was distributed to the Bankhead National Forest's mailing list and to other interested individuals. This brochure explained the need for action and asked for input to the process.
4) The Notice of Intent (NOI) was published in the Federal Register on May 24, 2002. The NOI asked for public comment on the proposal from May 24 through July 6, 2002. In addition, letters were sent to the Bankhead National Forest's mailing list and information regarding the Notice of Intent was published in the *Northwest Alabamian* on May 25, 2002.

Using the comments from the public and other agencies, the interdisciplinary team developed a list of issues to address (see *Issues* section).

The DEIS was mailed in July, 2003, to the publics that participated in the scoping process and the Notice of Availability appeared in the Federal Register on July 11, 2003. Comments to the DEIS were received through August 25, 2003 (see *Comments and Response* section).

Meetings were held with elected public officials in Winston and Lawrence Counties as well as Congressman Aderholt (and staff).to discuss the proposed actions and the effect on local economies.

Issues

The ID team developed issues based on the comments received from the scoping process. These issues were separated into two groups: significant and non-significant. Significant issues were defined as those directly or indirectly caused by implementing the proposed action. Non-significant issues were identified as those:

- Outside the scope of the proposed action
- Already decided by law, regulation, Forest Plan, or other higher level decision
- Irrelevant to the decision to be made
- Conjectural and not supported by scientific or factual evidence

The Council on Environmental Quality (CEQ) NEPA regulations explain this delineation in Sec. 1501.7, "…identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review (Sec. 1506.3)…". A list of non-significant issues and reasons regarding their categorization as non-significant are also discussed here. See the project file for more information on development of the significant issues.

The ID team identified the following issues during scoping:

1. Establishment and maintenance of fire dependent understory species in oak woodland, longleaf woodland, and shortleaf woodland ecosystems.

The desired future condition of the ecosystems in Areas 2 and 3 is oak, longleaf pine, and shortleaf pine overstory with native warm season grasses and forbs characterized by the blue stem grass association in the understory. Past experience shows that the bluestem association begins to appear in the understory with thinning and regular prescribed fire.

Indicator: Potential effects of the different alternatives will be estimated based on the amount of bluestem grasses present compared to brush species present in the understory.

2. Adversity of some publics to artificial regeneration.

Some species lend themselves to natural regeneration better than others. Those species that are not present in sufficient numbers sometimes need special treatment to reintroduce them to an area. Planting of the desired species is one option in this case. Other methods of restoring all sites to the desired conditions will be analyzed.

Indicator: Potential effects of the different alternatives will be estimated based on the potential of each alternative to accomplish the desired future condition for each site.

3. Impacts on recreational experiences and cultural values on the district.

Proposed activities will have beneficial and adverse effects on recreational experiences on the district. Some treatments may displace users for short periods of time and may alter visual quality temporarily. Some treatments may increase the number of users and improve users experiences over time by providing more open, park-like stands and more wildlife for viewing and hunting.

Indicator: Potential effects of the different alternatives will be estimated based on visual quality changes, wildlife habitat changes, and cultural values.

4. Impacts from Annosum Root Rot (ARR) and Littleleaf Disease (LLD).

Some soil types on the district have a high hazard rating for ARR and some others have a high hazard rating for LLD. Longleaf pine and hardwood are less susceptible to both maladies than loblolly or shortleaf pines. These sites will need special consideration during thinning and in planning for desired future conditions. It may be possible to mitigate these hazards through management techniques.

Indicator: Potential effects of the different alternatives will be estimated based on the risk of achieving and maintaining the desired future condition on these sites.

5. Early successional habitat (grass/forb and shrub/seedling/sapling associations) dispersed throughout the district.

A high percentage of the dispersed recreation use is from hunters (turkey and deer). Turkey and deer populations need early successional habitat stage habitats dispersed throughout their range to support healthy populations. Many species of songbirds and sensitive bird species also require early successional habitat stage habitats. This habitat can be met by conditions other than 0-10 year age classes.

Indicator: Potential effects of the different alternatives will be estimated based on the amount of early successional habitat created and maintained.

Other Issues Considered: The seven remaining preliminary issues were considered and determined non-significant for this analysis based upon implementation of standard mitigation measures, routine disclosure of effects, and the scope of this analysis. The seven non-significant issues are as follows:

6. Impacts of the proposed treatments on Federally listed species of plants and wildlife, which are defined by the Endangered Species Act of 1973 as amended, Forest Service Regional Forester's Sensitive Species list, and upon locally rare species.

Protection and enhancement of Federally listed species of plants and wildlife, Sensitive Species, and locally rare species are an important part of restoration to natural ecosystems. All mitigation measures as specified in the Standards and Guidelines of the Land and Resource Management Plan for the National forests in Alabama (LRMP) will be adhered too. A Biological Assessment (BA), or a Biological Evaluation (BE) will address these species and will point out any additional mitigation measures needed to insure their protection.

7. Protection of cultural resources.

Protection of cultural resources on the district is very important part of this proposal. Cultural resource surveys will be conducted on all proposed sites and subsequent reports and concurrences form the State Historical Preservation Officer (SHPO) will be completed prior to any ground disturbing activity. Any known cultural site will be protected by mitigation measures or treatment will not occur on that site.

8. Effects on management indicator species (MIS).

Management indicator species are a measure of how an environment is functioning. The effects analysis of each alternative will address key species and estimate the effect of the proposed treatments on the representative habitat.

9. Impact of prescribed burning on upland hardwoods.

This issue will be discussed in the analysis of each alternative.

10. Adversity of some publics to commercial logging.

Commercial logging is a method that is available to achieve the objectives of some of the proposed DFC's. This is not to say that it is the only method available and other options will be considered when they are available.

11. Impacts of thinning on the future restoration of pine and hardwood ecosystems.

These proposed thinning stands have a heavily stocked overstory of loblolly pine, a midstory of scattered hardwoods and suppressed loblolly pines, and a heavy understory of brush. Thinning of these stands will increase the amount of light that reaches the forest floor. This available light will increase the growth and coverage of the existing understory, which will suppress the desired understory unless special attention is given to these areas.

12. Impact to soil and water resources.

Protection and enhancement of soil and water resources are vital for restoration efforts to be successful. Mitigation measures as specified in the Standards and Guidelines of the LRMP have been shown to be adequate to protect soil and water resources during implementation of the proposed actions. Prior on-site monitoring/inspections on national forest lands in Alabama continue to confirm that adherence to standard mitigation measures (LRMP) provide adequate protection of soil and water resources.

13. Impacts to old growth.

This issue will be discussed in the analysis of each alternative.

Other Related Efforts

The management of the Bankhead National Forest generates a great deal of interest from a large number of individuals and organizations. The recent history of Forest Service management on the Bankhead can be characterized as controversial and without general public support and trust.

The Forest Service desires to move forward in a spirit of cooperation, as all interests try to find common ground. The goal is to replace the old controversy, with a positive and collaborative approach in helping to guide the future management of the Bankhead National Forest. The Forest Service, in partnership with the U.S. Institute of Environmental Conflict Resolution, contracted with RESOLVE and the Natural Resources Leadership Institute to:

- Identify key individuals and parties that will be involved in identifying and solving issues for the forest health and restoration project.
- Develop an assessment report that involves the key individuals and groups that identifies topics around the Bankhead forest health and restoration project, Alabama forest plan revision or other topics and a summary of stakeholder's attitudes toward the Forest Service.
- Improve or redesign the operation of the Bankhead Liaison Panel. The Panel members represent Wild Alabama, local timber interests, Treasure Forest landowners, Alabama Cooperative Extension Service, U.S. Fish and Wildlife Service, The Nature Conservancy, Alabama Department of Wildlife and Freshwater Fisheries, The Echota Cherokee Tribe of Alabama Heritage Committee, Echota Cherokee Tribe - Blue Clan, Northeast Alabama Cherokee, local landowners, county commissioners, and recreational interests. This includes adding additional needed stakeholders to the panel. The objective would be to improve relationships, improve communication, and develop opportunities for productive and positive collaboration.
- Design collaborative negotiation strategies for the Panel, including those who are in opposition to all or portions of the forest health project.
- Develop agreements between members of the Panel and other stakeholders for the desired condition of forest communities and a 5-year program of priority actions needed to address current issues.

All liaison panel meetings were held in a public forum and individual members of the panel as well as the public provided input and made recommendations to the US Forest Service during the scoping phase of the Bankhead National Forest Health and Restoration Project. A copy of these recommendations is in the project file at the Bankhead Ranger District office.

CHAPTER 2. ALTERNATIVES, INCLUDING THE PROPOSED ACTION

Introduction

This chapter describes and compares the alternatives considered by the ID team in the analysis. These alternatives were developed to present a reasonable range of options that address the needs and opportunities of the project area while considering the issues and concerns previously stated.

Alternatives Considered in Detail

Six alternatives were considered in detail in the analysis for possible implementation in the project area. Implementation of any action is to comply with the Standards and Guidelines of the Land and Resource Management Plan, National Forests in Alabama (LRMP) and the mitigation measures listed on page 48 of this chapter.

Alternative 1 (No Action)

Under this alternative, current management plans would continue to guide management of the project area. No desired future condition would be determined and none of the proposed activities would be implemented to accomplish project goals.

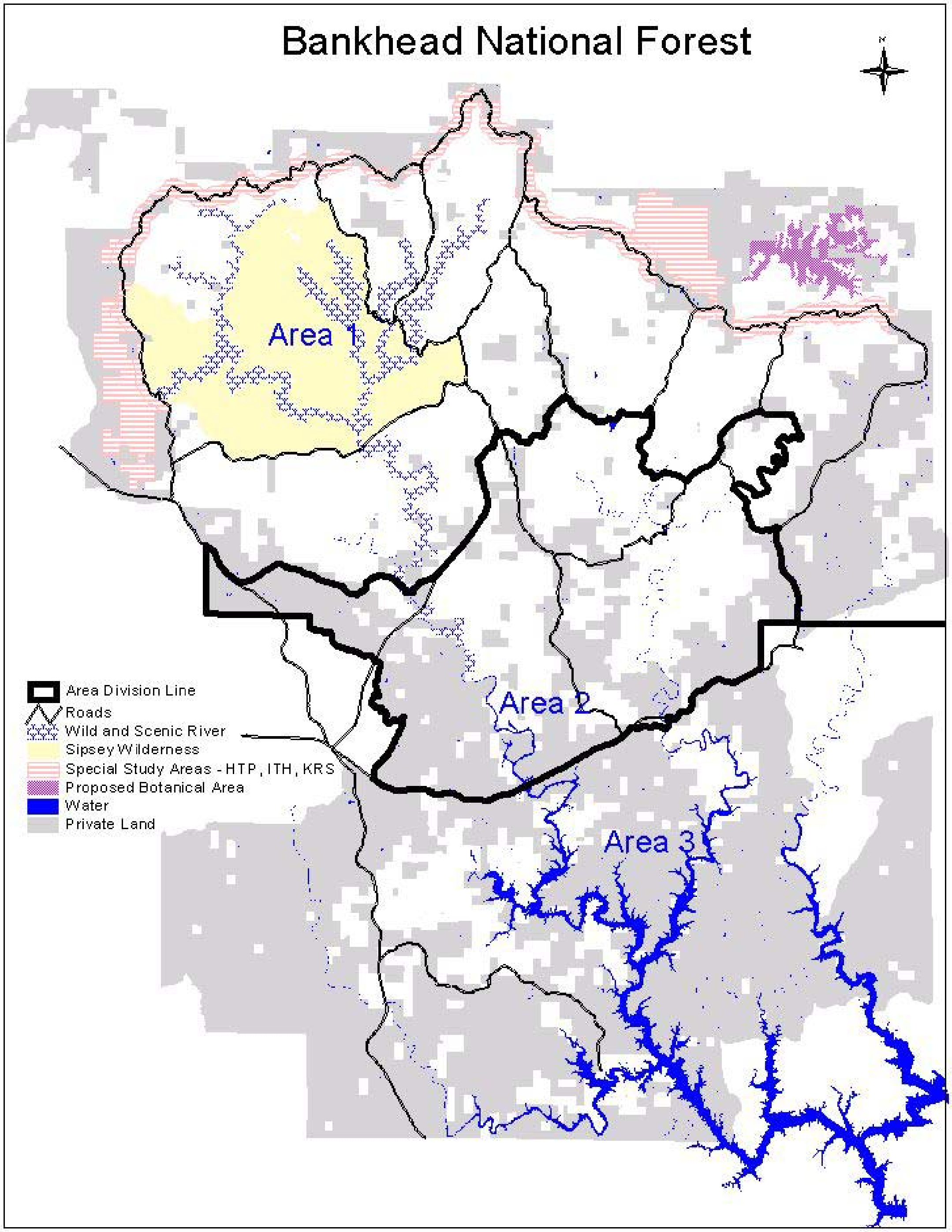


Figure 1 - Alternative 1 Map

Alternative 2 (Proposed Action)

This alternative proposes to determine the desired future conditions (DFC) of all existing loblolly pine stands on the district and to implement a five-year schedule of work to emphasize forest health and restoration. Proposed actions include thinning of overstocked loblolly pine stands and reforesting SPB damaged stands. Emphasis would be placed on six native upland forest community types, including all associated plant and wildlife species, on the Bankhead National Forest located in Winston, Lawrence, and Franklin Counties, Alabama.

The proposed action would focus on:

- Areas that are currently occupied by loblolly pine stands between the ages of 15 and 45 years old.
- Areas 10 acres and larger that have been killed by SPB infestations.

The proposed action addresses the need to improve and maintain healthy forest conditions and to provide forest communities and plant and animal habitats that are uncommon on other lands in the Cumberland Plateau. The proposed action includes:

- Intermediate thinning on approximately 18,143 acres of loblolly pine stands.
- Silvicultural site preparation of SPB impacted areas to better insure successful reforestation efforts.
- Natural and artificial reforestation to restore SPB impacted areas on approximately 7,382 acres killed by SPB.

A complete listing of the areas proposed for treatment and the treatment proposed for each is located in the Appendix. Descriptions of the forest community types are located in the Appendix.

This alternative describes the Desired Future Conditions (DFC) by dividing the forest into three separate geographic areas (see Figure 2).

Following is a description of DFC's and treatments by Area:

Area 1

This area would include the following community types:

- Conifer-Northern Hardwood
- Mixed Mesophytic
- River Flood Plain Hardwood
- Dry-Mesic Oak Forests
- Dry and Dry-Mesic Oak-Pine Forests
- Dry and Xeric Oak Forests
- Xeric Pine-oak Forests (Virginia pine)

The currently existing loblolly pine stands would be restored over time to one of the following community type:

- Dry-Mesic Oak Forests
- Dry and Dry-Mesic Oak-Pine Forests
- Dry and Xeric Oak Forests

The dry and xeric (very dry) oak and oak-pine forests would be primarily mid- to late-successional forests. These forests are characterized as having canopies ranging from closed forest conditions to open woodland conditions, with occasional small gaps up to ½ acre in size. Dominant overstory trees would include white oak, black oak, chestnut oak, scarlet oak, and post oak. The occurrence of prescribed fire in these areas, 1 or 2 times per decade would not inhibit a well-developed shrub and primarily mid-story canopy.

The mesic (moderately moist) oak and oak-pine forests and woodlands would be primarily mid- to late-successional forests. These forests would have a continuous dominant canopy of medium-sized trees, with occasional small gaps up to ½ acre in size. Dominant overstory trees would include sugar maple, beech, chestnut oak, black oak, scarlet oak, pignut hickory, mockernut hickory, shagbark hickory, loblolly pine, shortleaf pine, and Virginia pine. American chestnut historically was a major species in this forest community. These sites would have a well-developed shrub and mid-story canopy.

Treatments would include the following:

- Intermediate thinning of approximately 11,102 acres of loblolly pine forest to reduce basal area to between 70 to 85 square feet per acre. Trees favored for retention in order of priority in these areas are:
    - dominant hardwood trees
    - codominant hardwood trees
    - dominant/codominant pine
- Natural reforestation of upland hardwood and associated site preparation on approximately 4,669 acres of areas impacted by SPB and may include:
    - site preparation with handtools
    - prescribed burning
    - combination of both
    - left to regenerate naturally without site preparation

The favored hardwood species would include a variety of oak and hickory species. It is proposed that all timber sale harvest options would be available for this project.

The thinning would allow for the development of young oak, hickory, and other associated hardwood species in the understory that are somewhat intolerant of shade. This thinning would be the first phase of a long-term commitment (30-90 years) that would gradually replace these existing loblolly pine stands with dry and xeric oak forests, or dry-mesic oak and oak-pine forests. In some cases, this thinning would actually shift the stand condition from a predominantly pine stand to a predominately hardwood stand condition.

Site preparation for natural regeneration on restoration sites would consist of hand tools and prescribed fire, hand tools alone, prescribed fire alone, or no treatment. These treatments would be used to restore these sites to dry and xeric oak forests, or dry-mesic oak and oak-pine forests.

It is anticipated that prescribed fire would occur on parts of this area approximately 1 or 2 times per decade to reduce forest fuel build up.

Area 2

This area would include the following community types:

- Conifer-Northern Hardwood
- Mixed Mesophytic

- River Flood Plain Hardwood
- Dry-Mesic Oak Forests
- Dry and Dry-Mesic Oak-Pine Forests
- Dry and Xeric Oak Forests and Woodlands
- Xeric Pine-Oak Forests and Woodlands(Virginia pine and shortleaf/bluestem woodlands)

The currently existing loblolly pine stands would be restored over time to shortleaf/bluestem woodland communities.

The shortleaf/bluestem woodlands would be primarily mid- to late-successional forests. These forests are characterized as having open woodland conditions, with occasional small gaps up to ½ acre in size. The dominant overstory tree would be shortleaf pine. Other trees species that would be found at lower densities are: Virginia pine, loblolly pine, scarlet oak, chestnut oak, southern red oak, white oak, blackjack oak, and pignut hickory. The occurrence of prescribed fire in these areas, 2 or 3 times per decade would restrict tree density and promote the growth of shade intolerant native grasses, forbs, and shrubs.

Treatments would include the following:

- Intermediate thinning of approximately 4,233 acres of loblolly pine forest to reduce basal area to between 50 to 65 square feet per acre. Trees favored for retention in order of priority in these areas are:
    - dominant/codominant shortleaf pine
    - dominant/codominant longleaf pine
    - dominant/codominant loblolly pine
    - dominant/codominant oaks and hickory
- Artificial reforestation of shortleaf pine and associated site preparation on approximately 1,928 acres of areas impacted by SPB and may include:
    - site preparation by roller drum chopping
    - prescribed fire
    - combination of both
    - planting with shortleaf pine seedlings

It is proposed that all timber sale harvest options would be available for this project.

The thinning would allow for the development of understory, fire-dependent grasses and shrubs that are intolerant of shade. This thinning would be the first phase of a long-term commitment that would gradually replace these existing loblolly pine stands with shortleaf pine as the predominant overstory species, and bluestem grass association as the predominant understory.

Site preparation on restoration sites would consist of roller drum chopping and prescribed fire, followed by the planting of shortleaf pine seedlings. These treatments would begin the process of restoring these sites to shortleaf/bluestem woodlands.

It is anticipated that prescribed fire would occur on parts of this area 2 or 3 times per decade to reduce forest fuel build up, create open woodland conditions, and enhance wildlife habitat.

Area 3

This area would include the following community types:

- Conifer-Northern Hardwood
- Mixed Mesophytic
- River Flood Plain Hardwood
- Dry-Mesic Oak Forests
- Dry and Dry-Mesic Oak-Pine Forests
- Dry and Xeric Oak Forests and Woodlands
- Xeric Pine-Oak Forests and Woodlands(Virginia pine)
- Upland Longleaf Pine/Bluestem Woodlands

The currently existing loblolly pine stands would be restored over time to longleaf/bluestem woodland communities.

The longleaf/bluestem woodlands would be primarily mid- to late-successional forests. These forests are characterized as having open woodland conditions, with occasional small gaps up to ½ acre in size. The dominant overstory tree would be longleaf pine. Other trees species that would be found at lower densities are: Virginia pine, loblolly pine, scarlet oak, chestnut oak, southern red oak, white oak, blackjack oak, and pignut hickory. The occurrence of prescribed fire in these areas, 2 or 3 times per decade would restrict tree density and promote the growth of shade intolerant native grasses, forbs, and shrubs.

Treatments would include the following:

- Intermediate thinning of approximately 2,808 acres of loblolly pine forest to reduce basal area to between 50 to 65 square feet per acre. Trees favored for retention in order of priority in these areas are:
    - dominant/codominant longleaf pine
    - dominant/codominant shortleaf pine
    - dominant/codominant loblolly pine
    - dominant/codominant oaks and hickory
- Artificial reforestation of longleaf pine and associated site preparation on approximately 785 acres of areas impacted by SPB:
    - site preparation by roller drum chopping
    - prescribed fire
    - combination of both
    - planting with longleaf pine seedlings

It is proposed that all timber sale harvest options would be available for this project.

The thinning would allow for the development of understory, fire-dependent grasses and shrubs that are intolerant of shade. This thinning would be the first phase of a long-term commitment that would gradually replace these existing loblolly pine stands with longleaf pine as the predominant overstory species, and bluestem grass association as the predominant understory.

Site preparation on these sites would consist of roller drum chopping and prescribed fire, followed by planting of longleaf pine seedlings. These treatments would begin the process of restoring these sites to longleaf/bluestem woodlands.

It is anticipated that prescribed fire would occur on parts of this area 2 or 3 times per decade to reduce forest fuel build up, create open woodland conditions, and enhance wildlife habitat.

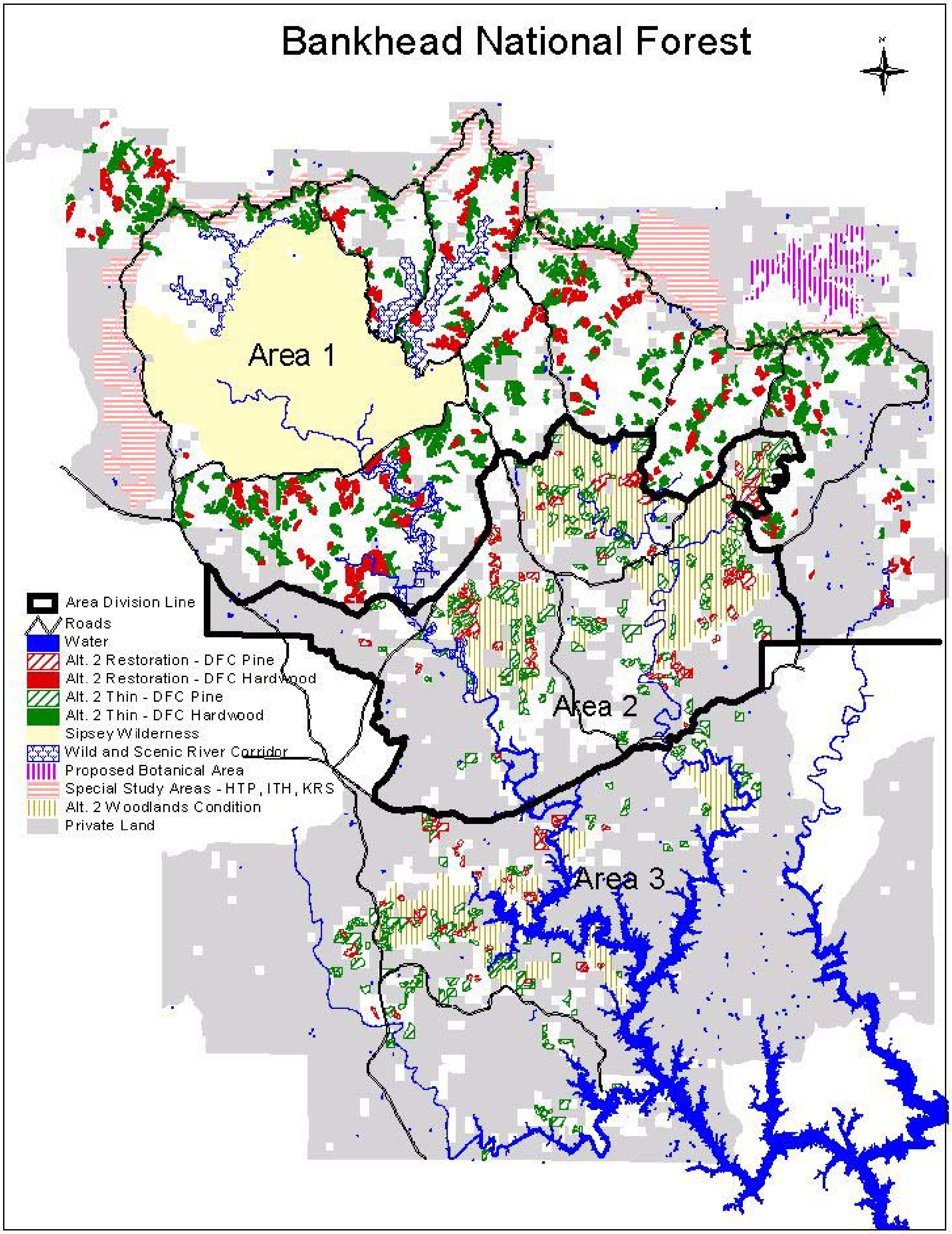


Figure 2 - Alternative 2 Map

Alternative 3

This alternative proposes to determine the desired future conditions (DFC) of all existing loblolly pine stands on the district and to implement a five-year schedule of work to emphasize forest health and restoration by thinning overstocked loblolly pine stands and reforesting SPB damaged stands. Emphasis would be placed on six native upland forest community types, including all associated plant and wildlife species, on the Bankhead National Forest located in Winston, Lawrence, and Franklin Counties, Alabama.

The proposed action would focus on:

- Areas that are currently occupied by loblolly pine stands that are between the ages of 15 and 45 years old.
- Areas 10 acres and larger that have been killed by SPB infestations.

The proposed action addresses the need to improve and maintain healthy forest conditions and to provide forest communities and plant and animal habitats that are uncommon on other lands in the Cumberland Plateau. The proposed action includes:

- Intermediate thinning on approximately 9,452 acres of loblolly pine stands.
- Silvicultural site preparation of SPB impacted areas to better insure successful reforestation efforts.
- Natural and artificial reforestation to restore SPB impacted areas on approximately 6,860 acres killed by SPB.

No treatments are proposed in the Proposed Botanical Area or the special study areas (High Town Path, Indian Tomb Hollow, and Kinlock Rock Shelter). A complete listing of the areas proposed for treatment and the treatment proposed for each is located in the Appendix. Descriptions of the forest community types are located in the Appendix.

This alternative describes the Desired Future Conditions (DFC) by dividing the forest into three separate geographic areas (see Figure 3).

Following is a description of DFC's and treatments by Area:

Area 1

This area would include the following community types:

- Conifer-Northern Hardwood
- Mixed Mesophytic
- River Flood Plain Hardwood
- Dry-Mesic Oak Forests
- Dry and Dry-Mesic Oak-Pine Forests
- Dry and Xeric Oak Forests
- Xeric Pine-Oak Forests (Virginia pine)

The currently existing loblolly pine stands would be restored over time to one of the following community type:

- Dry-Mesic Oak Forests
- Dry and Dry-Mesic Oak-Pine Forests

- Dry and Xeric Oak Forests

The dry and xeric (very dry) oak and oak-pine forests would be primarily mid- to late-successional forests. These forests are characterized as having canopies ranging from closed forest conditions to open woodland conditions, with occasional small gaps up to ½ acre in size. Dominant overstory trees would include white oak, black oak, chestnut oak, scarlet oak, and post oak. The occurrence of prescribed fire in these areas, 1 or 2 times per decade would not inhibit a well-developed shrub and mid-story canopy.

The mesic (moderately moist) oak and oak-pine forests would be primarily mid- to late-successional forests. These forests would have a continuous dominant canopy of medium-sized trees, with occasional small gaps up to ½ acre in size. Dominant overstory trees would include sugar maple, beech, chestnut oak, black oak, scarlet oak, pignut hickory, mockernut hickory, shagbark hickory, loblolly pine, shortleaf pine, and Virginia pine. American chestnut historically was a major species in this forest community. These sites would have a well-developed shrub and mid-story canopy.

Treatments would include the following:

- Intermediate thinning of approximately 4,092 acres of loblolly pine forest to reduce basal area to between 55 to 70 square feet per acre. Trees favored for retention in order of priority in these areas are:
    - dominant hardwood trees
    - codominant hardwood trees
    - dominant/codominant pine
- Natural reforestation of upland hardwood and associated site preparation on approximately 4,354 acres of areas impacted by SPB and may include:
    - site preparation with handtools
    - prescribed burning
    - combination of both
    - left to regenerate naturally without site preparation

The favored hardwood species would include a variety of oak and hickory species. It is proposed that all timber sale harvest options would be available for this project.

The thinning would allow for the development of young oak, hickory, and other associated hardwood species in the understory that are somewhat intolerant of shade. This thinning would be the first phase of a long-term commitment (30-90 years) that would gradually replace these existing loblolly pine stands with dry and xeric oak forests, or dry-mesic oak and oak-pine forests. In some cases, this thinning would actually shift the stand condition from a predominantly pine stand to a predominately hardwood stand condition.

Site preparation for natural regeneration on restoration sites would consist of hand tools and prescribed fire, hand tools alone, prescribed fire alone, or no treatment. These treatments would be used to restore these sites to dry and xeric oak forests, or dry-mesic oak and oak-pine forests.

It is anticipated that prescribed fire would occur on parts of this area approximately 1 or 2 times per decade to reduce forest fuel build up. Maintenance of existing wildlife openings (1 to 5 acres in size) would provide additional early succession type habitat.

Area 2

This area would include the following community types:

- Conifer-Northern Hardwood
- Mixed Mesophytic
- River Flood Plain Hardwood
- Dry-Mesic Oak Forests
- Dry and Dry-Mesic Oak-Pine Forests
- Dry and Xeric Oak Forests And Woodlands
- Xeric Pine-Oak Forests and Woodlands (Virginia pine and shortleaf/bluestem woodlands)

The currently existing loblolly pine stands would be restored over time to one of the following communities:

- Dry-Mesic Oak Forests
- Dry and Dry-Mesic Oak-Pine Forests
- Dry and Xeric Oak Forests and Woodlands (1,995 acres)
- Xeric Pine-Oak Forests and Woodlands (shortleaf/bluestem woodlands) (3,194 acres)

The dry and xeric (very dry) oak and oak-pine forests and woodlands would be primarily mid- to late-successional forests. These forests are characterized as having canopies ranging from closed forest conditions to open woodland conditions, with occasional small gaps up to ½ acre in size. Dominant overstory trees would include white oak, black oak, chestnut oak, scarlet oak, and post oak. The occurrence of prescribed fire in these areas, 2 or 3 times per decade would restrict tree density and promote the growth of shade intolerant grasses, forbs, and shrubs in some areas and in other areas these forests would have a well developed shrub and mid-story canopy.

The mesic (moderately moist) oak and oak-pine forests would be primarily mid- to late-successional forests. These forests would have a continuous dominant canopy of medium-sized trees, with occasional small gaps up to ½ acre in size. Dominant overstory trees would include sugar maple, beech, chestnut oak, black oak, scarlet oak, pignut hickory, mockernut hickory, shagbark hickory, loblolly pine, shortleaf pine, and Virginia pine. American chestnut historically was a major species in this forest community. These sites would have a well-developed shrub and mid-story canopy.

The shortleaf/bluestem woodlands would be primarily mid- to late-successional forests. These forests are characterized as having open woodland conditions, with occasional small gaps up to ½ acre in size. The dominant overstory tree would be shortleaf pine. Other trees species that would be found at lower densities are: Virginia pine, loblolly pine, scarlet oak, chestnut oak, southern red oak, white oak, blackjack oak, and pignut hickory. The occurrence of prescribed fire in these areas, 2 or 3 times per decade would restrict tree density and promote the growth of shade intolerant native grasses, forbs, and shrubs.

Treatments would include the following:

- Intermediate thinning of approximately 2,422 acres of loblolly pine forest to reduce basal area to between 55 to 70 square feet per acre. Trees favored for retention in order of priority in these areas are:
    - dominant/codominant shortleaf pine

    - dominant/codominant longleaf pine
    - dominant/codominant loblolly pine
    - dominant/codominant oaks and hickory
- Intermediate thinning of approximately 972 acres of loblolly pine forest to reduce basal area to between 55 to 70 square feet per acre. Trees favored for retention in order of priority in these areas are:
    - dominant hardwood trees
    - codominant hardwood trees
    - dominant/codominant pine
- Artificial reforestation of shortleaf pine and associated site preparation on approximately 1023 acres of areas impacted by SPB and may include:
    - site preparation by roller drum chopping
    - prescribed fire
    - combination of both
    - planting with shortleaf pine seedlings
- Natural reforestation of upland hardwood and associated site preparation on approximately 772 acres of areas impacted by SPB and may include:
    - site preparation with handtools
    - prescribed burning
    - combination of both
    - left to regenerate naturally without site preparation.

It is proposed that all timber sale harvest options would be available for this project.

The thinning would allow for the development of understory species that are intolerant of shade. This thinning would be the first phase of a long-term commitment that would gradually replace these existing loblolly pine stands with one of the following community types:

- Shortleaf pine as the predominant overstory species, and bluestem grass association as the predominant understory.
- Dry and xeric oak forests and woodlands, or dry-mesic oak and oak-pine forests.

Site preparation on restoration sites with DFC of shortleaf pine would consist of roller drum chopping and prescribed fire, followed by the planting of shortleaf pine seedlings. Site preparation on restoration sites with DFC of hardwood would consist of hand tools and prescribed fire, hand tools alone, prescribed fire alone, or no treatment. These treatments would begin the process of restoring these sites to the selected DFC.

It is anticipated that prescribed fire would occur on parts of this area 2 or 3 times per decade to reduce forest fuel build up, create open woodland conditions, and enhance wildlife habitat. Maintenance of existing wildlife openings (1 to 5 acres in size) would provide additional early successional habitat.

Area 3

This area would include the following community types:

- Conifer-Northern Hardwood
- Mixed Mesophytic
- River Flood Plain Hardwood
- Dry-Mesic Oak Forests
- Dry and Dry-Mesic Oak-Pine Forests
- Dry and Xeric Oak Forests and Woodlands
- Xeric Pine-Oak Forests and Woodlands (Virginia pine and shortleaf/bluestem woodlands)

The currently existing loblolly pine stands would be restored over time to one of the following communities:

- Dry-Mesic Oak Forests
- Dry and Dry-Mesic Oak-Pine Forests
- Dry and Xeric Oak Forests and Woodlands (1,484 acres)
- Xeric Pine-Oak Forests and Woodlands
- Upland Longleaf Pine/Bluestem Woodlands (1,193 acres)

The dry and xeric (very dry) oak and oak-pine forests and woodlands would be primarily mid- to late-successional forests. These forests are characterized as having canopies ranging from closed forest conditions to open woodland conditions, with occasional small gaps up to ½ acre in size. Dominant overstory trees would include white oak, black oak, chestnut oak, scarlet oak, and post oak. The occurrence of prescribed fire in these areas, 2 or 3 times per decade would restrict tree density and promote the growth of shade intolerant grasses, forbs, and shrubs in some areas and in other areas these forests would have a well developed shrub and mid-story canopy.

The mesic (moderately moist) oak and oak-pine forests would be primarily mid- to late-successional forests. These forests would have a continuous dominant canopy of medium-sized trees, with occasional small gaps up to ½ acre in size. Dominant overstory trees would include sugar maple, beech, chestnut oak, black oak, scarlet oak, pignut hickory, mockernut hickory, shagbark hickory, loblolly pine, shortleaf pine, and Virginia pine. American chestnut historically was a major species in this forest community. These sites would have a well-developed shrub and mid-story canopy.

The longleaf/bluestem woodlands would be primarily mid- to late-successional forests. These forests are characterized as having open woodland conditions, with occasional small gaps up to ½ acre in size. The dominant overstory tree would be longleaf pine. Other trees species that would be found at lower densities are: Virginia pine, loblolly pine, scarlet oak, chestnut oak, southern red oak, white oak, blackjack oak, and pignut hickory. The occurrence of prescribed fire in these areas, 2 or 3 times per decade would restrict tree density and promote the growth of shade intolerant native grasses, forbs, and shrubs.

Treatments would include the following:

- Intermediate thinning of approximately 1,025 acres of loblolly pine forest to reduce basal area to between 55 to 70 square feet per acre. Trees favored for retention in order of priority in these areas are:

  - dominant/codominant longleaf pine
  - dominant/codominant shortleaf pine
  - dominant/codominant loblolly pine
  - dominant/codominant oaks and hickory
- Intermediate thinning of approximately 941 acres of loblolly pine forest to reduce basal area to between 55 to 70 square feet per acre. Trees favored for retention in order of priority in these areas are:
  - dominant hardwood trees
  - codominant hardwood trees
  - dominant/codominant pine
- Artificial reforestation of longleaf pine and associated site preparation on approximately 168 acres of areas impacted by SPB and may include:
  - site preparation by roller drum chopping
  - prescribed fire
  - combination of both
  - planting with longleaf pine seedlings
- Natural reforestation of upland hardwood and associated site preparation on approximately 543 acres of areas impacted by SPB and may include:
  - site preparation with handtools
  - prescribed burning
  - combination of both
  - left to regenerate naturally without site preparation.

It is proposed that all timber sale harvest options would be available for this project.

The thinning would allow for the development of understory species that are intolerant of shade. This thinning would be the first phase of a long-term commitment that would gradually replace these existing loblolly pine stands with one of the following community types:

- Longleaf pine as the predominant overstory species, and bluestem grass association as the predominant understory.
- Dry and xeric oak forests and woodlands, or dry-mesic oak and oak-pine forests.

Site preparation on restoration sites with DFC of longleaf pine would consist of roller drum chopping and prescribed fire, followed by the planting of longleaf pine seedlings. Site preparation on restoration sites with DFC of hardwood would consist of hand tools and prescribed fire, hand tools alone, prescribed fire alone, or no treatment. These treatments would begin the process of restoring these sites to the selected DFC.

It is anticipated that prescribed fire would occur on parts of this area 2 or 3 times per decade to reduce forest fuel build up, create open woodland conditions, and enhance wildlife habitat. Maintenance of existing wildlife openings (1 to 5 acres in size) would provide additional early successional habitat.

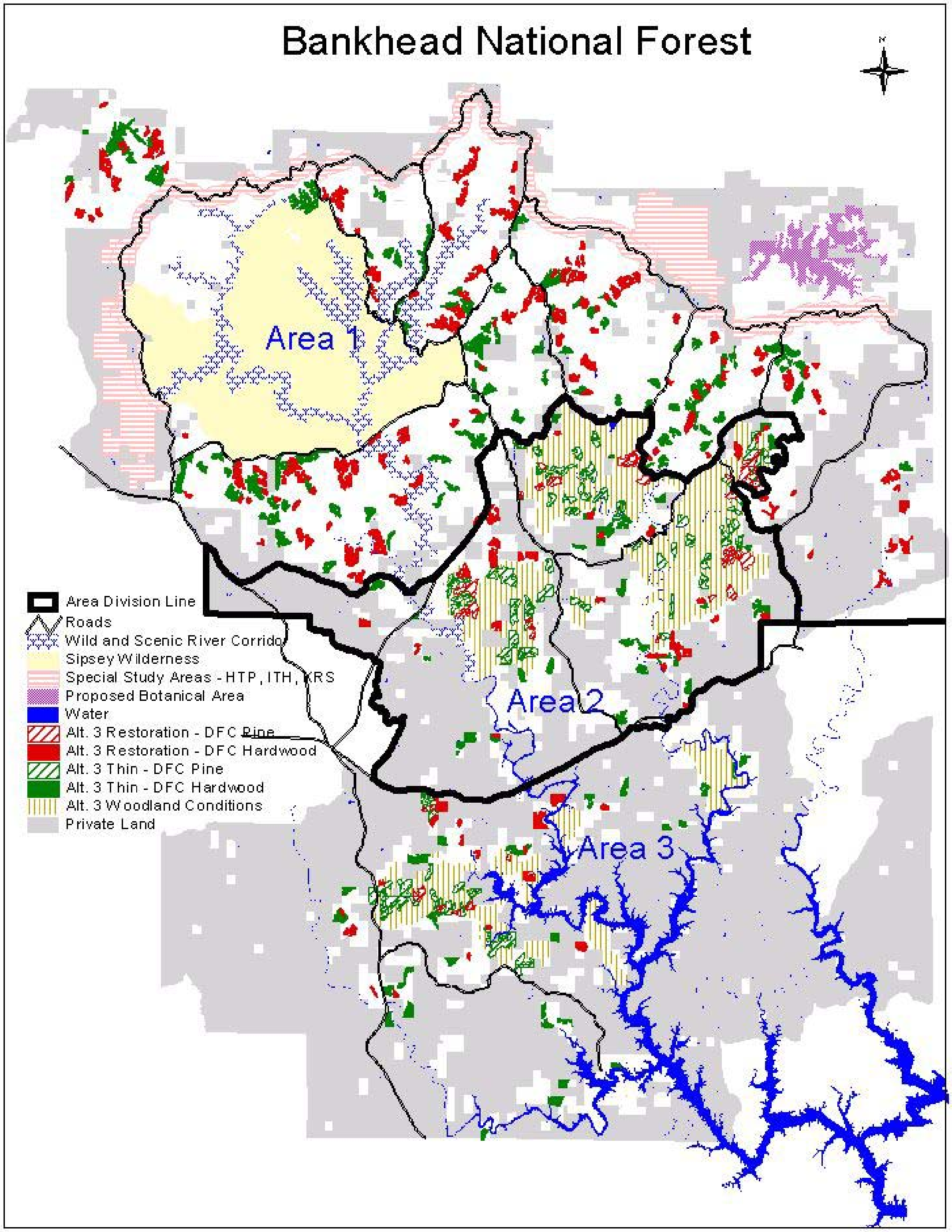


Figure 3 - Alternative 3 Map

Alternative 4

This alternative proposes to determine the desired future conditions (DFC) of all existing loblolly pine stands on the district and to implement a five-year schedule of work to emphasize forest health and restoration by thinning overstocked loblolly pine stands and reforesting SPB damaged stands. Emphasis would be placed on six native upland forest community types, including all associated plant and wildlife species, on the Bankhead National Forest located in Winston, Lawrence, and Franklin Counties, Alabama.

The proposed action would focus on:

- Areas that are currently occupied by loblolly pine stands that are between the ages of 15 and 45 years old.
- Areas 10 acres and larger that have been killed by SPB infestations.

The proposed action addresses the need to improve and maintain healthy forest conditions and to provide forest communities and plant and animal habitats that are uncommon on other lands in the Cumberland Plateau. The proposed action includes:

- Intermediate thinning on approximately 8,627 acres of loblolly pine stands.
- Silvicultural site preparation of SPB impacted areas to better insure successful reforestation efforts.
- Natural and artificial reforestation to restore SPB impacted areas on approximately 6,860 acres killed by SPB.

No treatments are proposed in the Proposed Botanical Area or the special study areas (High Town Path, Indian Tomb Hollow, and Kinlock Rock Shelter). A complete listing of the areas proposed for treatment and the treatment proposed for each is located in the Appendix. Descriptions of the forest community types are located in the Appendix.

This alternative describes the Desired Future Conditions (DFC) by dividing the forest into three separate geographic areas (see Figure 4).

Following is a description of DFC's and treatments by Area:

Area 1

This area would include the following community types:

- Conifer-Northern Hardwood
- Mixed Mesophytic
- River Flood Plain Hardwood
- Dry-Mesic Oak Forests
- Dry and Dry-Mesic Oak-Pine Forests
- Dry and Xeric Oak Forests
- Xeric Pine-Oak Forests (Virginia pine)

The currently existing loblolly pine stands would be restored over time to one of the following community type:

- Dry-Mesic Oak Forests
- Dry and Dry-Mesic Oak-Pine Forests

- Dry and Xeric Oak Forests

The dry and xeric (very dry) oak and oak-pine forests would be primarily mid- to late-successional forests. These forests are characterized as having canopies ranging from closed forest conditions to open woodland conditions, with occasional small gaps up to ½ acre in size. Dominant overstory trees would include white oak, black oak, chestnut oak, scarlet oak, and post oak. The occurrence of prescribed fire in these areas, 1 or 2 times per decade would not inhibit a well-developed shrub and mid-story canopy.

The mesic (moderately moist) oak and oak-pine forests would be primarily mid- to late-successional forests. These forests would have a continuous dominant canopy of medium-sized trees, with occasional small gaps up to ½ acre in size. Dominant overstory trees would include sugar maple, beech, chestnut oak, black oak, scarlet oak, pignut hickory, mockernut hickory, shagbark hickory, loblolly pine, shortleaf pine, and Virginia pine. American chestnut historically was a major species in this forest community. These sites would have a well-developed shrub and mid-story canopy.

Treatments would include the following:

- Intermediate thinning of approximately 3,978 acres of loblolly pine forest to reduce basal area to between 55 to 70 square feet per acre. Trees favored for retention in order of priority in these areas are:
    - dominant hardwood trees
    - codominant hardwood trees
    - dominant/codominant pine
- Natural reforestation of upland hardwood and associated site preparation on approximately 4,354 acres of areas impacted by SPB and may include:
    - site preparation with handtools
    - prescribed burning
    - combination of both
    - left to regenerate naturally without site preparation.

The favored hardwood species would include a variety of oak and hickory species. It is proposed that all timber sale harvest options would be available for this project.

The thinning would allow for the development of young oak, hickory, and other associated hardwood species in the understory that are somewhat intolerant of shade. This thinning would be the first phase of a long-term commitment (30-90 years) that would gradually replace these existing loblolly pine stands with dry and xeric oak forests, or dry-mesic oak and oak-pine forests. In some cases, this thinning would actually shift the stand condition from a predominantly pine stand to a predominately hardwood stand condition.

Site preparation for natural regeneration on restoration sites would consist of hand tools and prescribed fire, hand tools alone, prescribed fire alone, or no treatment. These treatments would be used to restore these sites to dry and xeric oak forests, or dry-mesic oak and oak-pine forests.

It is anticipated that prescribed fire would occur on parts of this area 1 or 2 times per decade to reduce forest fuel build up. Maintenance of existing wildlife openings (1 to 5 acres in size) would provide additional early succession type habitat.

Area 2

This area would include the following community types:

- Conifer-Northern Hardwood
- Mixed Mesophytic
- River Flood Plain Hardwood
- Dry-Mesic Oak Forests
- Dry and Dry-Mesic Oak-Pine Forests
- Dry and Xeric Oak Forests
- Xeric Pine-Oak Forests (Virginia pine)

The currently existing loblolly pine stands would be restored over time to one of the following community type:

- Dry-Mesic Oak Forests
- Dry and Dry-Mesic Oak-Pine Forests
- Dry and Xeric Oak Forests and Woodlands

The dry and xeric (very dry) oak and oak-pine forests would be primarily mid- to late-successional forests. These forests are characterized as having canopies ranging from closed forest conditions to open woodland conditions, with occasional small gaps up to ½ acre in size. Dominant overstory trees would include white oak, black oak, chestnut oak, scarlet oak, and post oak. The occurrence of prescribed fire in these areas, 1 or 2 times per decade would not inhibit a well-developed shrub and mid-story canopy.

The mesic (moderately moist) oak and oak-pine forests would be primarily mid- to late-successional forests. These forests would have a continuous dominant canopy of medium-sized trees, with occasional small gaps up to ½ acre in size. Dominant overstory trees would include sugar maple, beech, chestnut oak, black oak, scarlet oak, pignut hickory, mockernut hickory, shagbark hickory, loblolly pine, shortleaf pine, and Virginia pine. American chestnut historically was a major species in this forest community. These sites would have a well-developed shrub and mid-story canopy.

Treatments would include the following:

- Intermediate thinning of approximately 2,683 acres of loblolly pine forest to reduce basal area to between 55 to 70 square feet per acre. Trees favored for retention in order of priority in these areas are:
    - dominant hardwood trees
    - codominant hardwood trees
    - dominant/codominant pine
- Natural reforestation and associated site preparation on approximately 1,795 acres of areas impacted by SPB and may include:
    - site preparation with handtools
    - prescribed burning
    - combination of both
    - left to regenerate naturally without site preparation.

The favored hardwood species would include a variety of oak and hickory species. It is proposed that all timber sale harvest options would be available for this project.

The thinning would allow for the development of young oak, hickory, and other associated hardwood species in the understory that are somewhat intolerant of shade. This thinning would be the first phase of a long-term commitment (30-90 years) that would gradually replace these existing loblolly pine stands with dry and xeric oak forests and woodlands, or dry-mesic oak and oak-pine forests. In some cases, this thinning would actually shift the stand condition from a predominantly pine stand to a predominately hardwood stand condition.

Site preparation for natural regeneration on restoration sites would consist of hand tools and prescribed fire, hand tools alone, prescribed fire alone, or no treatment. These treatments would be used to restore these sites to dry and xeric oak forests and woodlands, or dry-mesic oak and oak-pine forests.

It is anticipated that prescribed fire would occur on parts of this area 1 or 2 times per decade to reduce forest fuel build up. Maintenance of existing wildlife openings (1 to 5 acres in size) would provide additional early succession type habitat.

Area 3

This area would include the following community types:

- Conifer-Northern Hardwood
- Mixed Mesophytic
- River Flood Plain Hardwood
- Dry-Mesic Oak Forests
- Dry and Dry-Mesic Oak-Pine Forests
- Dry and Xeric Oak Forests and Woodlands
- Xeric Pine-Oak Forests and Woodlands (Virginia pine and shortleaf/bluestem woodlands)

The currently existing loblolly pine stands would be restored over time to one of the following communities:

- Dry-Mesic Oak Forests
- Dry and Dry-Mesic Oak-Pine Forests
- Dry and Xeric Oak Forests and Woodlands (1,484 acres)
- Xeric Pine-Oak Forests and Woodlands
- Upland Longleaf Pine/Bluestem Woodlands (1,193 acres)

The dry and xeric (very dry) oak and oak-pine forests and woodlands would be primarily mid- to late-successional forests. These forests are characterized as having canopies ranging from closed forest conditions to open woodland conditions, with occasional small gaps up to ½ acre in size. Dominant overstory trees would include white oak, black oak, chestnut oak, scarlet oak, and post oak. The occurrence of prescribed fire in these areas, 2 or 3 times per decade, would restrict tree density and promote the growth of shade intolerant grasses, forbs, and shrubs in some areas and in other areas these forests would have a well developed shrub and mid-story canopy.

The mesic (moderately moist) oak and oak-pine forests would be primarily mid- to late-successional forests. These forests would have a continuous dominant canopy of medium-sized trees, with occasional small gaps up to ½ acre in size. Dominant overstory trees would include sugar maple, beech, chestnut oak, black oak, scarlet oak, pignut hickory, mockernut hickory, shagbark hickory, loblolly pine, shortleaf pine, and Virginia pine. American chestnut historically was a major species in this forest community. These sites would have a well-developed shrub and mid-story canopy.

The longleaf/bluestem woodlands would be primarily mid- to late-successional forests. These forests are characterized as having open woodland conditions, with occasional small gaps up to ½ acre in size. The dominant overstory tree would be longleaf pine. Other trees species that would be found at lower densities are: Virginia pine, loblolly pine, scarlet oak, chestnut oak, southern red oak, white oak, blackjack oak, and pignut hickory. The occurrence of prescribed fire in these areas, 2 or 3 times per decade would restrict tree density and promote the growth of shade intolerant native grasses, forbs, and shrubs.

Treatments would include the following:

- Intermediate thinning of approximately 1,025 acres of loblolly pine forest to reduce basal area to between 55 to 70 square feet per acre. Trees favored for retention in order of priority in these areas are:
  - dominant/codominant longleaf pine
  - dominant/codominant shortleaf pine
  - dominant/codominant loblolly pine
  - dominant/codominant oaks and hickory
- Intermediate thinning of approximately 941 acres of loblolly pine forest to reduce basal area to between 55 to 70 square feet per acre. Trees favored for retention in order of priority in these areas are:
  - dominant hardwood trees
  - codominant hardwood trees
  - dominant/codominant pine
- Artificial reforestation of longleaf pine and associated site preparation on approximately 168 acres of areas impacted by SPB and may include:
  - site preparation by roller drum chopping
  - prescribed fire
  - combination of both
  - planting with longleaf pine seedlings
- Natural reforestation of upland hardwood and associated site preparation on approximately 543 acres of areas impacted by SPB and may include:
  - site preparation with handtools
  - prescribed burning
  - combination of both
  - left to regenerate naturally without site preparation.

It is proposed that all timber sale harvest options would be available for this project.

The thinning would allow for the development of understory species that are intolerant of shade. This thinning would be the first phase of a long-term commitment that would gradually replace these existing loblolly pine stands with one of the following community types:

- Longleaf pine as the predominant overstory species, and bluestem grass association as the predominant understory.
- Dry and xeric oak forests and woodlands, or dry-mesic oak and oak-pine forests.

Site preparation on restoration sites with DFC of longleaf pine would consist of roller drum chopping and prescribed fire, followed by the planting of longleaf pine seedlings. Site preparation on restoration sites with DFC of hardwood would consist of hand tools and prescribed fire, hand tools alone, prescribed fire alone, or no treatment. These treatments would begin the process of restoring these sites to the selected DFC.

It is anticipated that prescribed fire would occur on parts of this area 2 or 3 times per decade to reduce forest fuel build up, create open woodland conditions, and enhance wildlife habitat. Maintenance of existing wildlife openings (1 to 5 acres in size) would provide additional early succession type habitat.

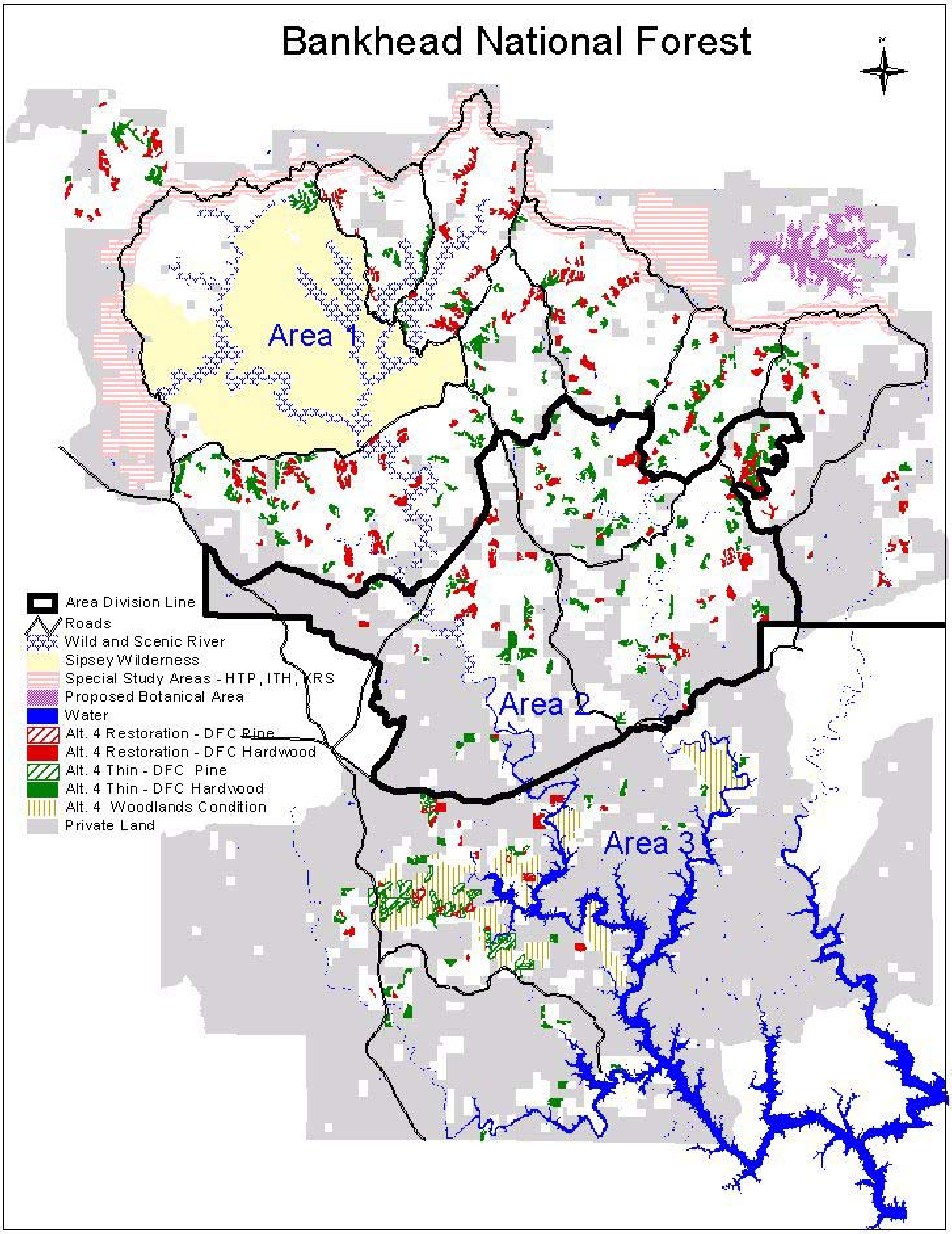


Figure 4 - Alternative 4 Map

Alternative 5 (Preferred Alternative)

This alternative proposes to determine the desired future conditions (DFC) of all existing loblolly pine stands on the district and to implement a five-year schedule of work to emphasize forest health and restoration by thinning overstocked loblolly pine stands and reforesting SPB damaged stands. Emphasis would be placed on six native upland forest community types, including all associated plant and wildlife species, on the Bankhead National Forest located in Winston, Lawrence, and Franklin Counties, Alabama.

The proposed action would focus on:

- Areas that are currently occupied by loblolly pine stands that are between the ages of 15 and 45 years old.
- Areas 10 acres and larger that have been killed by SPB infestations.

The proposed action addresses the need to improve and maintain healthy forest conditions; to provide forest communities and plant and animal habitats that are uncommon on other lands in the Cumberland Plateau; and to provide additional early successional habitat (grass/forb and shrub/seedling/sapling associations) for wildlife. The proposed action includes:

- Intermediate thinning on approximately 9,452 acres of loblolly pine stands.
- Silvicultural site preparation of SPB impacted areas to better insure successful reforestation efforts.
- Natural and artificial reforestation to restore SPB impacted areas on approximately 6,860 acres killed by SPB.

No treatments are proposed in the Proposed Botanical Area or the special study areas (High Town Path, Indian Tomb Hollow, and Kinlock Rock Shelter). A complete listing of the areas proposed for treatment and the treatment proposed for each is located in the Appendix. Descriptions of the forest community types are located in the Appendix.

This alternative describes the Desired Future Conditions (DFC) by dividing the forest into three separate geographic areas (see Figure 5).

Following is a description of DFC's and treatments by Area:

Area 1

This area would include the following community types:

- Conifer-Northern Hardwood
- Mixed Mesophytic
- River Flood Plain Hardwood
- Dry-Mesic Oak Forests
- Dry and Dry-Mesic Oak-Pine Forests
- Dry and Xeric Oak Forests and Woodlands
- Xeric Pine-Oak Forests and Woodlands (Virginia pine)

The currently existing loblolly pine stands would be restored over time to one of the following community type:

- Dry-Mesic Oak Forests
- Dry and Dry-Mesic Oak-Pine Forests

- Dry and Xeric Oak Forests and Woodlands

The dry and xeric (very dry) oak and oak-pine forests and woodlands would be primarily mid- to late-successional forests. These forests are characterized as having canopies ranging from closed forest conditions to open woodland conditions, with occasional small gaps up to 1 acre in size. Dominant overstory trees would include white oak, black oak, chestnut oak, scarlet oak, and post oak. The occurrence of prescribed fire in these areas, 1 or 2 times per decade would not inhibit a well-developed shrub and mid-story canopy over most of this area. On a designated 8,115 acres (see Figure 5) the occurrence of prescribed fire 2 or 3 times per decade, would restrict tree density and promote the growth of shade intolerant grasses, forbs, and shrubs and create an oak woodlands community type.

The mesic (moderately moist) oak and oak-pine forests would be primarily mid- to late-successional forests. These forests would have a continuous dominant canopy of medium-sized trees, with occasional small gaps up to one acre in size. Dominant overstory trees would include sugar maple, beech, chestnut oak, black oak, scarlet oak, pignut hickory, mockernut hickory, shagbark hickory, loblolly pine, shortleaf pine, and Virginia pine. American chestnut historically was a major species in this forest community. These sites would have a well-developed shrub and mid-story canopy.

A goal in Area 1 would be to achieve early successional habitat, well distributed, on up to 10 percent of the area. This goal could be met by:

- woodland areas on 8,115 acres (see Figure 5)
- additional woodland acres
- wildlife openings
- canopy gap openings
- establishment of areas less than 10 acres in size to provide for early successional habitat
- power line rights of way

Treatments proposed in this five-year plan would include the following:

- Intermediate thinning of approximately 4,092 acres of loblolly pine forest to reduce basal area to between 55 to 70 square feet per acre. Trees favored for retention in order of priority in these areas are:
    - dominant hardwood trees
    - codominant hardwood trees
    - dominant/codominant pine
- Natural reforestation of upland hardwood and associated site preparation on approximately 4,354 acres of areas impacted by SPB and may include:
    - site preparation with handtools
    - prescribed burning
    - combination of both
    - left to regenerate naturally without site preparation.

The favored hardwood species would include a variety of oak and hickory species. It is proposed that all timber sale harvest options would be available for this project.

The thinning would allow for the development of young oak, hickory, and other associated hardwood species in the understory that are somewhat intolerant of shade. This thinning would be the first phase of a long-term commitment (30-90 years) that would gradually replace these existing loblolly pine stands with dry and xeric oak forests, or dry-mesic oak and oak-pine forests. In some cases, this thinning would actually shift the stand condition from a predominantly pine stand to a predominately hardwood stand condition.

It is anticipated that these thinning sales will be open to all conventional logging methods, however, opportunities to accomplish some thinning with newly developed harvesting methods will be explored.

Site preparation for natural regeneration on restoration sites would consist of hand tools and prescribed fire, hand tools alone, prescribed fire alone, or no treatment. These treatments would be used to restore these sites to dry and xeric oak forests, or dry-mesic oak and oak-pine forests.

It is anticipated that prescribed fire would occur on parts of this area 1 or 2 times per decade to reduce forest fuel build up and on 8,115 acres 2 or 3 times per decade to reduce forest fuel build up, create open woodland conditions, and enhance wildlife habitat. It is important that the decision of when to burn be based on fuel loading and/or the need to reduce the amount of understory to maintain woodland conditions. Other projects to provide early succession type habitat may be under taken (ie. maintenance of existing wildlife openings and construction of new wildlife openings 1 to 5 acres in size).

Area 2

This area would include the following community types:

- Conifer-Northern Hardwood
- Mixed Mesophytic
- River Flood Plain Hardwood
- Dry-Mesic Oak Forests
- Dry and Dry-Mesic Oak-Pine Forests
- Dry and Xeric Oak Forests and Woodlands
- Xeric Pine-Oak Forests and Woodlands (Virginia pine and shortleaf/bluestem woodlands)

The currently existing loblolly pine stands would be restored over time to one of the following communities:

- Dry-Mesic Oak Forests
- Dry and Dry-Mesic Oak-Pine Forests
- Dry and Xeric Oak Forests and Woodlands (1,995 acres)
- Xeric Pine-Oak Forests and Woodlands (shortleaf/bluestem woodlands) (3,194 acres)

The dry and xeric (very dry) oak and oak-pine forests and woodlands would be primarily mid- to late-successional forests. These forests are characterized as having canopies ranging from closed forest conditions to open woodland conditions, with occasional small gaps up to ½ acre in size. Dominant overstory trees would include white oak, black oak, chestnut oak, scarlet oak, and post oak. The occurrence of prescribed fire in woodland areas, 2 or 3 times per decade would restrict tree density and promote the growth of shade intolerant grasses, forbs, and shrubs, and in other areas these forests would have a well developed shrub and mid-story canopy.

The mesic (moderately moist) oak and oak-pine forests would be primarily mid- to late-successional forests. These forests would have a continuous dominant canopy of medium-sized trees, with occasional small gaps up to ½ acre in size. Dominant overstory trees would include sugar maple, beech, chestnut oak, black oak, scarlet oak, pignut hickory, mockernut hickory, shagbark hickory, loblolly pine, shortleaf pine, and Virginia pine. American chestnut historically was a major species in this forest community. These sites would have a well-developed shrub and mid-story canopy.

The shortleaf/bluestem woodlands would be primarily mid- to late-successional forests. These forests are characterized as having open woodland conditions, with occasional small gaps up to ½ acre in size. The dominant overstory tree would be shortleaf pine. Other trees species that would be found at lower densities are: Virginia pine, loblolly pine, scarlet oak, chestnut oak, southern red oak, white oak, blackjack oak, and pignut hickory. The occurrence of prescribed fire in these areas, 2 or 3 times per decade would restrict tree density and promote the growth of shade intolerant native grasses, forbs, and shrubs.

Treatments proposed in this five-year plan would include the following:

- Intermediate thinning of approximately 2,422 acres of loblolly pine forest to reduce basal area to between 55 to 70 square feet per acre. Trees favored for retention in order of priority in these areas are:
    - dominant/codominant shortleaf pine
    - dominant/codominant longleaf pine
    - dominant/codominant loblolly pine
    - dominant/codominant oaks and hickory
- Intermediate thinning of approximately 972 acres of loblolly pine forest to reduce basal area to between 55 to 70 square feet per acre. Trees favored for retention in order of priority in these areas are:
    - dominant hardwood trees
    - codominant hardwood trees
    - dominant/codominant pine
- Artificial reforestation of shortleaf pine and associated site preparation on approximately 1023 acres of areas impacted by SPB and may include:
    - site preparation by roller drum chopping or new methods that may be developed
    - prescribed fire
    - combination of both
    - planting with shortleaf pine seedlings
- Natural reforestation of upland hardwood and associated site preparation on approximately 772 acres of areas impacted by SPB and may include:
    - site preparation with handtools
    - prescribed burning
    - combination of both
    - left to regenerate naturally without site preparation.

It is proposed that all timber sale harvest options would be available for this project.

The thinning would allow for the development of understory species that are intolerant of shade. This thinning would be the first phase of a long-term commitment that would gradually replace these existing loblolly pine stands with one of the following community types:

- Shortleaf pine as the predominant overstory species, and bluestem grass association as the predominant understory.
- Dry and xeric oak forests and woodlands, or dry-mesic oak and oak-pine forests.

It is anticipated that these thinning sales will be open to all conventional logging methods, however, opportunities to accomplish some thinning with newly developed harvesting methods will be explored.

Site preparation on restoration sites with DFC of shortleaf pine would consist of roller drum chopping and prescribed fire, followed by the planting of shortleaf pine seedlings. Site preparation on restoration sites with DFC of hardwood would consist of hand tools and prescribed fire, hand tools alone, prescribed fire alone, or no treatment. These treatments would begin the process of restoring these sites to the selected DFC.

It is anticipated that prescribed fire would occur on parts of this area 2 or 3 times per decade to reduce forest fuel build up, create open woodland conditions, and enhance wildlife habitat. It is important that the decision of when to burn be based on fuel loading and/or the need to reduce the amount of understory to maintain woodland conditions. Maintenance of existing wildlife openings (1 to 5 acres in size) would provide additional early succession type habitat. Other projects could be under taken to provide more early successional type habitat (ie. construction of new wildlife openings 1 to 5 acres in size).

Area 3

This area would include the following community types:

- Conifer-Northern Hardwood
- Mixed Mesophytic
- River Flood Plain Hardwood
- Dry-Mesic Oak Forests
- Dry and Dry-Mesic Oak-Pine Forests
- Dry and Xeric Oak Forests and Woodlands
- Xeric Pine-Oak Forests and Woodlands (Virginia pine and longleaf/bluestem woodlands)

The currently existing loblolly pine stands would be restored over time to one of the following communities:

- Dry-Mesic Oak Forests
- Dry and Dry-Mesic Oak-Pine Forests
- Dry and Xeric Oak Forests and Woodlands (1,484 acres)
- Xeric Pine-Oak Forests and Woodlands
- Upland Longleaf Pine/Bluestem Woodlands (1,193 acres)

The dry and xeric (very dry) oak and oak-pine forests and woodlands would be primarily mid- to late-successional forests. These forests are characterized as having canopies ranging from closed forest conditions to open woodland conditions, with occasional small gaps up to ½ acre in size. Dominant overstory trees would include white oak, black oak, chestnut oak, scarlet oak, and post oak. The occurrence of prescribed fire in woodland areas, 2 or 3 times per decade would restrict tree density and promote the growth of shade intolerant grasses, forbs, and shrubs, and in other areas these forests would have a well developed shrub and mid-story canopy.

The mesic (moderately moist) oak and oak-pine forests would be primarily mid- to late-successional forests. These forests would have a continuous dominant canopy of medium-sized trees, with occasional small gaps up to ½ acre in size. Dominant overstory trees would include sugar maple, beech, chestnut oak, black oak, scarlet oak, pignut hickory, mockernut hickory, shagbark hickory, loblolly pine, shortleaf pine, and Virginia pine. American chestnut historically was a major species in this forest community. These sites would have a well-developed shrub and mid-story canopy.

The longleaf/bluestem woodlands would be primarily mid- to late-successional forests. These forests are characterized as having open woodland conditions, with occasional small gaps up to ½ acre in size. The dominant overstory tree would be longleaf pine. Other trees species that would be found at lower densities are: Virginia pine, loblolly pine, scarlet oak, chestnut oak, southern red oak, white oak, blackjack oak, and pignut hickory. The occurrence of prescribed fire in these areas, 2 or 3 times per decade would restrict tree density and promote the growth of shade intolerant native grasses, forbs, and shrubs.

Treatments would include the following:

- Intermediate thinning of approximately 1,025 acres of loblolly pine forest to reduce basal area to between 55 to 70 square feet per acre. Trees favored for retention in order of priority in these areas are:
    - dominant/codominant longleaf pine
    - dominant/codominant shortleafleaf pine
    - dominant/codominant loblolly pine
    - dominant/codominant oaks and hickory
- Intermediate thinning of approximately 941 acres of loblolly pine forest to reduce basal area to between 55 to 70 square feet per acre. Trees favored for retention in order of priority in these areas are:
    - dominant hardwood trees
    - codominant hardwood trees
    - dominant/codominant pine
- Artificial reforestation of longleaf pine and associated site preparation on approximately 168 acres of areas impacted by SPB and may include:
    - site preparation by roller drum chopping or new methods that may be developed
    - prescribed fire
    - combination of both
    - planting with longleaf pine seedlings
- Natural reforestation of upland hardwood and associated site preparation on approximately 543 acres of areas impacted by SPB and may include:
    - site preparation with handtools
    - prescribed burning
    - combination of both

  - left to regenerate naturally without site preparation.

It is proposed that all timber sale harvest options would be available for this project.

The thinning would allow for the development of understory species that are intolerant of shade. This thinning would be the first phase of a long-term commitment that would gradually replace these existing loblolly pine stands with one of the following community types:

- Longleaf pine as the predominant overstory species, and bluestem grass association as the predominant understory.
- Dry and xeric oak forests and woodlands, or dry-mesic oak and oak-pine forests.

It is anticipated that these thinning sales will be open to all conventional logging methods, however, opportunities to accomplish some thinning with newly developed harvesting methods will be explored.

Site preparation on restoration sites with DFC of longleaf pine would consist of roller drum chopping and prescribed fire, followed by the planting of longleaf pine seedlings. Site preparation on restoration sites with DFC of hardwood would consist of hand tools and prescribed fire, hand tools alone, prescribed fire alone, or no treatment. These treatments would begin the process of restoring these sites to the selected DFC.

It is anticipated that prescribed fire would occur on parts of this area 2 or 3 times per decade to reduce forest fuel build up, create open woodland conditions, and enhance wildlife habitat. It is important that the decision of when to burn be based on fuel loading and/or the need to reduce the amount of understory to maintain woodland conditions. Maintenance of existing wildlife openings (1 to 5 acres in size) would provide additional early succession type habitat. Other projects could be under taken to provide more early successional type habitat (ie. construction of new wildlife openings 1 to 5 acres in size).

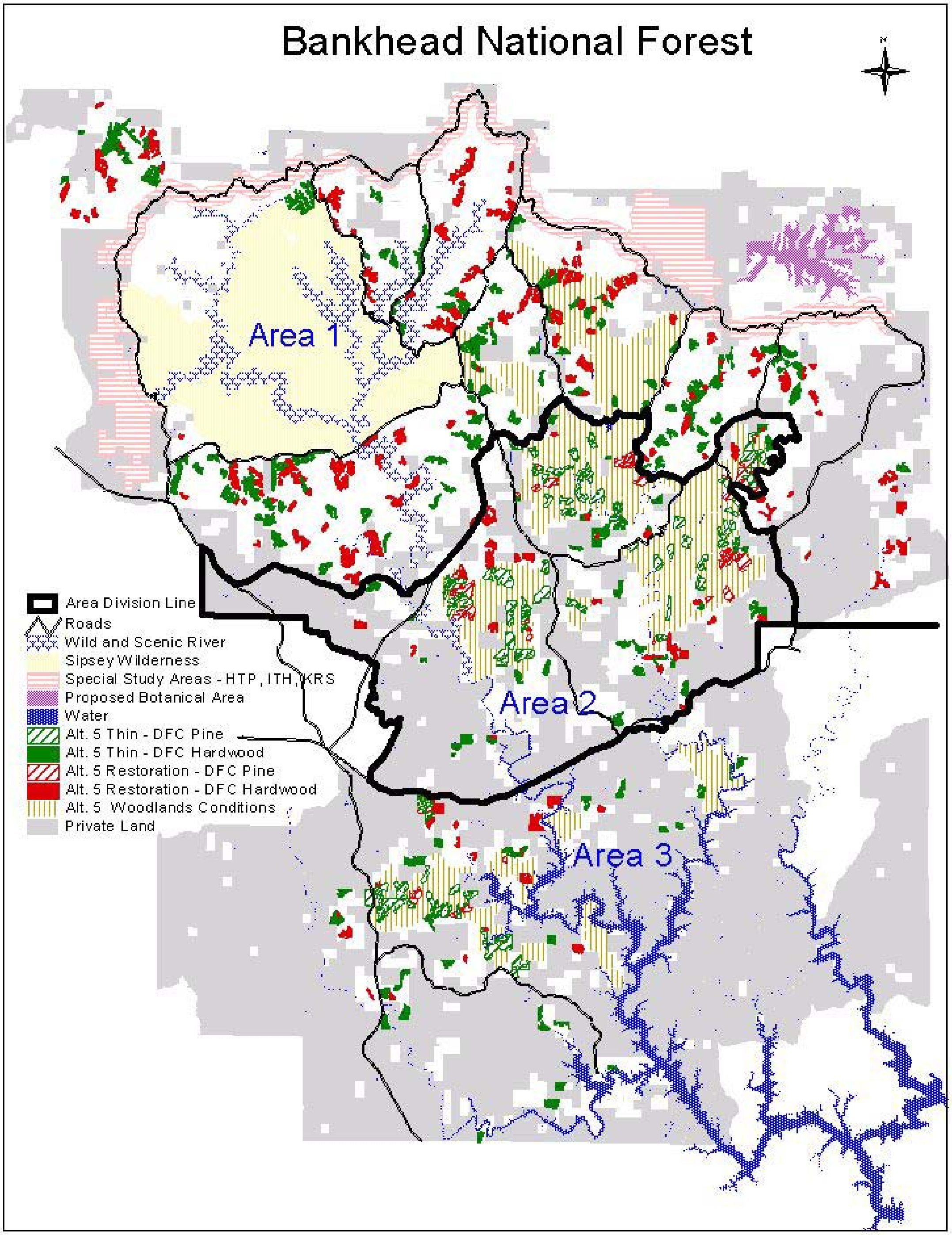


Figure 5 - Alternative 5 Map

Alternative 6

This alternative proposes to determine the desired future conditions (DFC) of all existing loblolly pine stands on the district and to implement a five-year schedule of work to emphasize forest health and restoration of SPB damaged stands by thinning overstocked loblolly pine stands and reforesting SPB damaged stands. Emphasis would be placed on six native upland forest community types, including all associated plant and wildlife species, on the Bankhead National Forest located in Winston, Lawrence, and Franklin Counties, Alabama.

This alternative is the same as Alternative 3, except all treatments would be accomplished by contract. The sale of wood products would be used only to remove merchantable material after completion of the treatment contracts.

The proposed action would focus on:

- Areas that are currently occupied by loblolly pine stands that are between the ages of 15 and 45 years old.
- Areas 10 acres and larger that have been killed by SPB infestations.

The proposed action addresses the need to improve and maintain healthy forest conditions and to provide forest communities and plant and animal habitats that are uncommon on other lands in the Cumberland Plateau. The proposed action includes:

- Intermediate thinning on approximately 9,452 acres of loblolly pine stands.
- Silvicultural site preparation of SPB impacted areas to better insure successful reforestation efforts.
- Natural and artificial reforestation to restore SPB impacted areas on approximately 6,860 acres killed by SPB.

No treatments are proposed in the Proposed Botanical Area or the special study areas (High Town Path, Indian Tomb Hollow, and Kinlock Rock Shelter). A complete listing of the areas proposed for treatment and the treatment proposed for each is located in the Appendix. Descriptions of the forest community types are located in the Appendix.

This alternative describes the Desired Future Conditions (DFC) by dividing the forest into three separate geographic areas (see Figure 6).

Following is a description of DFC's and treatments by Area:

Area 1

This area would include the following community types:

- Conifer-Northern Hardwood
- Mixed Mesophytic
- River Flood Plain Hardwood
- Dry-Mesic Oak Forests
- Dry and Dry-Mesic Oak-Pine Forests
- Dry and Xeric Oak Forests
- Xeric Pine-Oak Forests (Virginia pine)

The currently existing loblolly pine stands would be restored over time to one of the following community type:

- Dry-Mesic Oak Forests
- Dry and Dry-Mesic Oak-Pine Forests
- Dry and Xeric Oak Forests

The dry and xeric (very dry) oak and oak-pine forests would be primarily mid- to late-successional forests. These forests are characterized as having canopies ranging from closed forest conditions to open woodland conditions, with occasional small gaps up to ½ acre in size. Dominant overstory trees would include white oak, black oak, chestnut oak, scarlet oak, and post oak. The occurrence of prescribed fire in these areas, 1 or 2 times per decade would not inhibit a well-developed shrub and mid-story canopy.

The mesic (moderately moist) oak and oak-pine forests would be primarily mid- to late-successional forests. These forests would have a continuous dominant canopy of medium-sized trees, with occasional small gaps up to ½ acre in size. Dominant overstory trees would include sugar maple, beech, chestnut oak, black oak, scarlet oak, pignut hickory, mockernut hickory, shagbark hickory, loblolly pine, shortleaf pine, and Virginia pine. American chestnut historically was a major species in this forest community. These sites would have a well-developed shrub and mid-story canopy.

Treatments would include the following:

- Intermediate thinning of approximately 4,092 acres of loblolly pine forest to reduce basal area to between 55 to 70 square feet per acre. Trees favored for retention in order of priority in these areas are:
    - dominant hardwood trees
    - codominant hardwood trees
    - dominant/codominant pine
- Natural reforestation of upland hardwood and associated site preparation on approximately 4,354 acres of areas impacted by SPB and may include:
    - site preparation with handtools
    - prescribed burning
    - combination of both
    - left to regenerate naturally without site preparation.

The favored hardwood species would include a variety of oak and hickory species. It is proposed that all timber sale harvest options would be available for this project.

The thinning would allow for the development of young oak, hickory, and other associated hardwood species in the understory that are somewhat intolerant of shade. This thinning would be the first phase of a long-term commitment (30-90 years) that would gradually replace these existing loblolly pine stands with dry and xeric oak forests, or dry-mesic oak and oak-pine forests. In some cases, this thinning would actually shift the stand condition from a predominantly pine stand to a predominately hardwood stand condition.

Site preparation for natural regeneration on restoration sites would consist of hand tools and prescribed fire, hand tools alone, prescribed fire alone, or no treatment. These treatments would be used to restore these sites to dry and xeric oak forests, or dry-mesic oak and oak-pine forests.

It is anticipated that prescribed fire would occur on parts of this area 1 or 2 times per decade to reduce forest fuel build up. Maintenance of existing wildlife openings (1 to 5 acres in size) would provide additional early succession type habitat.

Area 2

This area would include the following community types:

- Conifer-Northern Hardwood
- Mixed Mesophytic
- River Flood Plain Hardwood
- Dry-Mesic Oak Forests
- Dry and Dry-Mesic Oak-Pine Forests
- Dry and Xeric Oak Forests and Woodlands
- Xeric Pine-Oak Forests and Woodlands (Virginia pine and shortleaf/bluestem woodlands)

The currently existing loblolly pine stands would be restored over time to one of the following communities:

- Dry-Mesic Oak Forests
- Dry and Dry-Mesic Oak-Pine Forests
- Dry and Xeric Oak Forests and Woodlands (1,995 acres)
- Xeric Pine-Oak Forests and Woodlands (shortleaf/bluestem woodlands) (3,194 acres)

The dry and xeric (very dry) oak and oak-pine forests and woodlands would be primarily mid- to late-successional forests. These forests are characterized as having canopies ranging from closed forest conditions to open woodland conditions, with occasional small gaps up to ½ acre in size. Dominant overstory trees would include white oak, black oak, chestnut oak, scarlet oak, and post oak. The occurrence of prescribed fire in these areas, 2 or 3 times per decade would restrict tree density and promote the growth of shade intolerant grasses, forbs, and shrubs in some areas and in other areas these forests would have a well developed shrub and mid-story canopy.

The mesic (moderately moist) oak and oak-pine forests would be primarily mid- to late-successional forests. These forests would have a continuous dominant canopy of medium-sized trees, with occasional small gaps up to ½ acre in size. Dominant overstory trees would include sugar maple, beech, chestnut oak, black oak, scarlet oak, pignut hickory, mockernut hickory, shagbark hickory, loblolly pine, shortleaf pine, and Virginia pine. American chestnut historically was a major species in this forest community. These sites would have a well-developed shrub and mid-story canopy.

The shortleaf/bluestem woodlands would be primarily mid- to late-successional forests. These forests are characterized as having open woodland conditions, with occasional small gaps up to ½ acre in size. The dominant overstory tree would be shortleaf pine. Other trees species that would be found at lower densities are: Virginia pine, loblolly pine, scarlet oak, chestnut oak, southern red oak, white oak, blackjack oak, and pignut hickory. The occurrence of prescribed fire in these areas, 2 or 3 times per decade would restrict tree density and promote the growth of shade intolerant native grasses, forbs, and shrubs.

Treatments would include the following:

- Intermediate thinning of approximately 2,422 acres of loblolly pine forest to reduce basal area to between 55 to 70 square feet per acre. Trees favored for retention in order of priority in these areas are:
  - dominant/codominant shortleaf pine

    - dominant/codominant longleaf pine
    - dominant/codominant loblolly pine
    - dominant/codominant oaks and hickory
- Intermediate thinning of approximately 972 acres of loblolly pine forest to reduce basal area to between 55 to 70 square feet per acre. Trees favored for retention in order of priority in these areas are:
    - dominant hardwood trees
    - codominant hardwood trees
    - dominant/codominant pine
- Artificial reforestation of shortleaf pine and associated site preparation on approximately 1023 acres of areas impacted by SPB and may include:
    - site preparation by roller drum chopping
    - prescribed fire
    - combination of both
    - planting with shortleaf pine seedlings
- Natural reforestation of upland hardwood and associated site preparation on approximately 772 acres of areas impacted by SPB and may include:
    - site preparation with handtools
    - prescribed burning
    - combination of both
    - left to regenerate naturally without site preparation.

It is proposed that all timber sale harvest options would be available for this project.

The thinning would allow for the development of understory species that are intolerant of shade. This thinning would be the first phase of a long-term commitment that would gradually replace these existing loblolly pine stands with one of the following community types:

- Shortleaf pine as the predominant overstory species, and bluestem grass association as the predominant understory.
- Dry and xeric oak forests and woodlands, or dry-mesic oak and oak-pine forests.

Site preparation on restoration sites with DFC of shortleaf pine would consist of roller drum chopping and prescribed fire, followed by the planting of shortleaf pine seedlings. Site preparation on restoration sites with DFC of hardwood would consist of hand tools and prescribed fire, hand tools alone, prescribed fire alone, or no treatment. These treatments would begin the process of restoring these sites to the selected DFC.

It is anticipated that prescribed fire would occur on parts of this area 2 or 3 times per decade to reduce forest fuel build up, create open woodland conditions, and enhance wildlife habitat. Maintenance of existing wildlife openings (1 to 5 acres in size) would provide additional early succession type habitat.

Area 3

This area would include the following community types:

- Conifer-Northern Hardwood
- Mixed Mesophytic
- River Flood Plain Hardwood
- Dry-Mesic Oak Forests
- Dry and Dry-Mesic Oak-Pine Forests
- Dry and Xeric Oak Forests and Woodlands
- Xeric Pine-Oak Forests and Woodlands (Virginia pine and longleaf/bluestem woodlands)

The currently existing loblolly pine stands would be restored over time to one of the following communities:

- Dry-Mesic Oak Forests
- Dry and Dry-Mesic Oak-Pine Forests
- Dry and Xeric Oak Forests and Woodlands (1,484 acres)
- Xeric Pine-Oak Forests and Woodlands
- Upland Longleaf Pine/Bluestem Woodlands (1,193 acres)

The dry and xeric (very dry) oak and oak-pine forests and woodlands would be primarily mid- to late-successional forests. These forests are characterized as having canopies ranging from closed forest conditions to open woodland conditions, with occasional small gaps up to ½ acre in size. Dominant overstory trees would include white oak, black oak, chestnut oak, scarlet oak, and post oak. The occurrence of prescribed fire in these areas, 2 or 3 times per decade would restrict tree density and promote the growth of shade intolerant grasses, forbs, and shrubs in some areas and in other areas these forests would have a well developed shrub and mid-story canopy.

The mesic (moderately moist) oak and oak-pine forests would be primarily mid- to late-successional forests. These forests would have a continuous dominant canopy of medium-sized trees, with occasional small gaps up to ½ acre in size. Dominant overstory trees would include sugar maple, beech, chestnut oak, black oak, scarlet oak, pignut hickory, mockernut hickory, shagbark hickory, loblolly pine, shortleaf pine, and Virginia pine. American chestnut historically was a major species in this forest community. These sites would have a well-developed shrub and mid-story canopy.

The longleaf/bluestem woodlands would be primarily mid- to late-successional forests. These forests are characterized as having open woodland conditions, with occasional small gaps up to ½ acre in size. The dominant overstory tree would be longleaf pine. Other trees species that would be found at lower densities are: Virginia pine, loblolly pine, scarlet oak, chestnut oak, southern red oak, white oak, blackjack oak, and pignut hickory. The occurrence of prescribed fire in these areas, 2 or 3 times per decade would restrict tree density and promote the growth of shade intolerant native grasses, forbs, and shrubs.

Treatments would include the following:

- Intermediate thinning of approximately 1,025 acres of loblolly pine forest to reduce basal area to between 55 to 70 square feet per acre. Trees favored for retention in order of priority in these areas are:
    - dominant/codominant longleaf pine

- o dominant/codominant shortleafleaf pine
- o dominant/codominant loblolly pine
- o dominant/codominant oaks and hickory

- Intermediate thinning of approximately 941 acres of loblolly pine forest to reduce basal area to between 55 to 70 square feet per acre. Trees favored for retention in order of priority in these areas are:
    - o dominant hardwood trees
    - o codominant hardwood trees
    - o dominant/codominant pine
- Artificial reforestation of longleaf pine and associated site preparation on approximately 168 acres of areas impacted by SPB and may include:
    - o site preparation by roller drum chopping
    - o prescribed fire
    - o combination of both
    - o planting with longleaf pine seedlings
- Natural reforestation of upland hardwood and associated site preparation on approximately 543 acres of areas impacted by SPB and may include:
    - o site preparation with handtools
    - o prescribed burning
    - o combination of both
    - o left to regenerate naturally without site preparation.

It is proposed that all timber sale harvest options would be available for this project.

The thinning would allow for the development of understory species that are intolerant of shade. This thinning would be the first phase of a long-term commitment that would gradually replace these existing loblolly pine stands with one of the following community types:

- Longleaf pine as the predominant overstory species, and bluestem grass association as the predominant understory.
- Dry and xeric oak forests and woodlands, or dry-mesic oak and oak-pine forests.

Site preparation on restoration sites with DFC of longleaf pine would consist of roller drum chopping and prescribed fire, followed by the planting of longleaf pine seedlings. Site preparation on restoration sites with DFC of hardwood would consist of hand tools and prescribed fire, hand tools alone, prescribed fire alone, or no treatment. These treatments would begin the process of restoring these sites to the selected DFC.

It is anticipated that prescribed fire would occur on parts of this area 2 or 3 times per decade to reduce forest fuel build up, create open woodland conditions, and enhance wildlife habitat. Maintenance of existing wildlife openings (1 to 5 acres in size) would provide additional early succession type habitat.

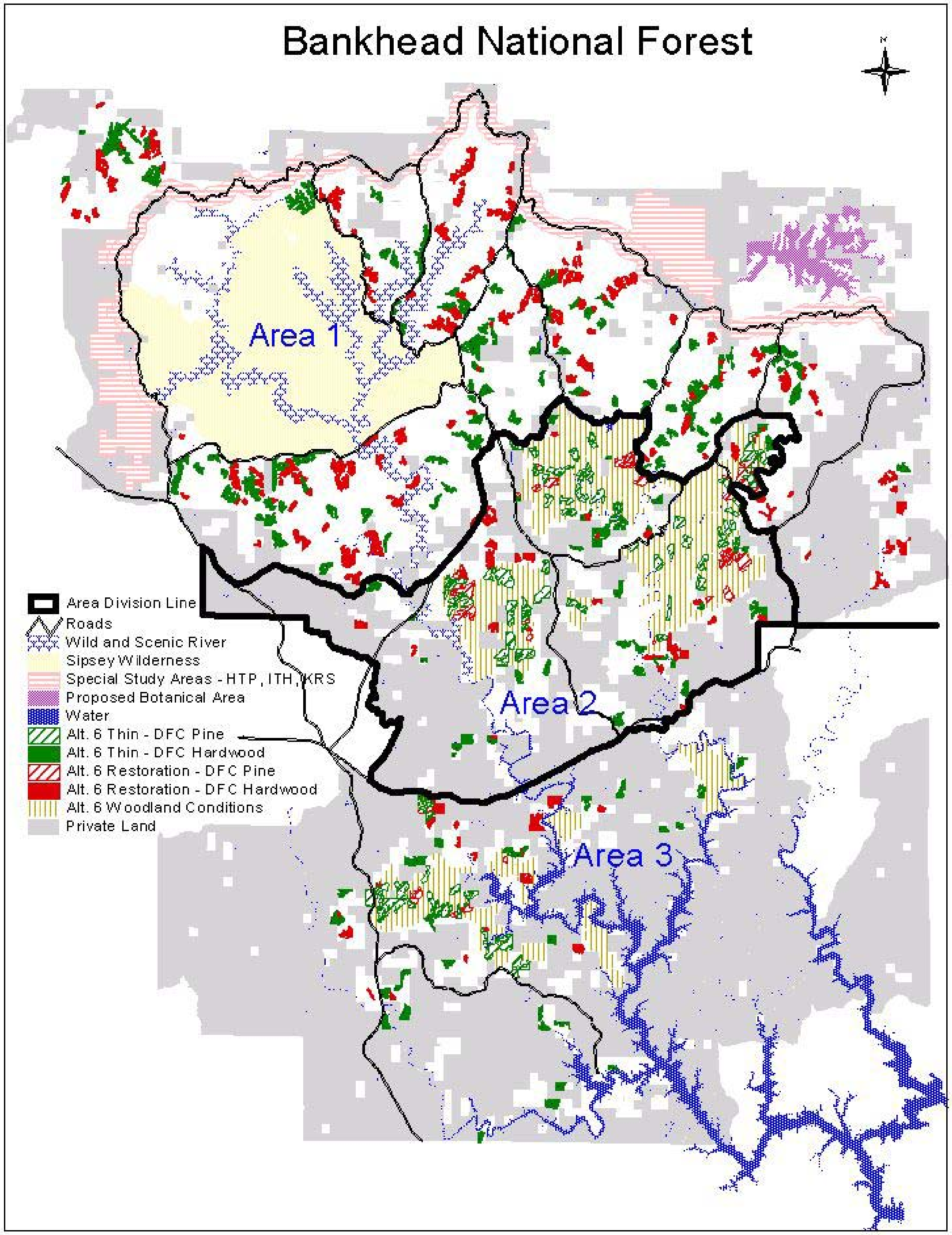


Figure 6 - Alternative 6 Map

Mitigation Common to All Alternatives

State approved best management practices (BMP) will be met or exceeded for all alternatives. In accordance with the State Water Quality Management Plan, BMP's for silvicultural practices are designed to protect water quality needs for designated beneficial uses. Management actions in compliance with these BMP's will insure compliance with the Clean Water Act.

Mitigating measures called for the Final Environmental Impact Statement, Vegetation Management in the Appalachian Mountains (VM EIS), and the Standards and Guidelines in the LRMP, Chapter IV, pages IV-106 to IV-112 will be followed. Below is a summarized list of the key mitigating measures for Alternatives 2 through 6. These measures are to be used as part of all of the action alternatives.

1. Construct turnouts and/or wing ditches as needed to reduce the potential for erosion, when plowing firelines for prescribed burning.
2. Monitor plowed firelines for any erosion problems and waterbar, seed, fertilize, and mulch as necessary to prevent erosion.
3. Trees will be felled away from streams whenever possible. Debris placed in streams during logging operations will be removed during or immediately after the operation.
4. Streamside management zones will be applied where applicable and as specified by Amendment 14 to the LRMP or the riparian guidelines outlined in the Draft Revised Forest Land and Resource Management Plan (DRLRMP). The more stringent of these guidelines will be adhered to.
5. Stream channels will not be used as skid trails. Log decks will be located outside streamside management zones. After their use, log decks and temporary roads will be revegetated, as site conditions require.
6. On soils with a moderate to severe soil compaction rating mechanical site preparation treatments will be accomplished when soils are dry. Soils are considered dry when rutting and/or equipment slippage is minimal.
7. All areas requiring re-vegetation for erosion control will be treated during the spring and or fall grass planting seasons or within 6 months following the close out of the ground disturbing activity. The areas will be considered successfully treated when 85% or greater vegetation cover is established within 2 years of the initial treatment.
8. A minimum 35 foot no equipment zone will be maintained around gully heads and sidewalls. Timber may be selectively removed from within the 35 foot zone with the use of chainsaws and cable only.
9. Resource activities that may affect water quality will implement State Best Management Practices (BMP) as a minimum to meet water quality objectives. LRMP standards that exceed State BMP's will take precedence.
10. Soil disturbing activities (excluding roads and trails) will not take place on water-saturated soils. Standing water and puddling are evidence of a saturated condition. (Soil disturbing activities are not limited to timber harvesting.)
11. Slash burns are done so they do not consume all litter and duff and alter structure and color of mineral soil on more than 20 percent of the area.
12. Water Control structures necessary for the control of surface water movement from disturbed sites will be constructed during or within two weeks following construction for temporary roads and within two weeks following the close out of the disturbing activity for skid trails.

13. Mineral soil exposure from ground disturbing activities (roads and trails excluded) will not exceed 10% on slopes exceeding 20% and 20% on slopes 20% or less.
14. Water control structures necessary for the control of surface water movement on fire lines will be installed during fire line construction. Permanent fire lines will have water control structures maintained.
15. The method for drum chopping should be perpendicular to the contour of the land to minimize erosive effects. Chopping is allowed on sustained slopes over 15 percent, however no mechanical equipment is used on sustained slopes over 35 percent. Mechanical site preparation is not conducted on sustained slopes over 20 percent, with erodible soils. Mechanical equipment such as choppers are not allowed in stream channels except at designated crossing points.
16. No harvest activity will take place within areas designated for protection such as rock outcrops and rock bluffs.
17. Wetlands will be delineated before project operations commence and will be protected according to LRMP standards and guidelines.
18. The existing database of known caves within the areas proposed for treatment has been reviewed. Mitigation practices for preserving the unique habitats provided by caves include the reservation of a 200 foot buffer around the entrance to all known caves. Prohibited activities within this buffer include the use of wheeled vehicles or tractors (except on existing roads), mechanical site preparation, vegetation clearing, fire line construction, and or construction of temporary roads, skid trails or log landings. By combining this buffer with streamside management practices the impacts to influent caves are minimized.
19. All requirements related to retention of streamside management zones will be followed to protect riparian sites that may be utilized for roosting and foraging by Indiana or gray bats. Hibernacula for Indiana or gray bats that are known or may be discovered will be protected as outlined in the LRMP and the DRLRMP. The Forest Service will coordinate with Fish and Wildlife Service prior to any project action within the vicinity of known hibernacula of Indiana or gray bats. Trees, that are known to be utilized as roost trees by Indiana or gray bats will be avoided during forest management activities. Retention of dead snags suitable for use by Indiana or gray bats and living, high priority roost trees will be required for any activity that removes tree stems such as thinning or site preparation activities.
20. Thinning on sites that are at high risk for annosum root rot will be done between the months of May and August or the cut stumps will be treated with borax. This will reduce the risk of annosum infections.
21. On sites that are at high risk for littleleaf disease regenerate to hardwood species or longleaf pine. On sites with moderate risk for littleleaf disease where shortleaf pine will be planted use wider spacing to reduce root competition and competitive stress.
22. Mitigation for Activity in the Retention Areas along Roads:
    - Leave a 100 feet buffer of desirable understory plants along the road, in a manner to best accomplish the DFC.
    - Remove or cut the slash in the 100 feet buffer zone to lie within two feet of the ground.
    - Leave dogwoods and showy mast understory in restoration areas whenever reasonable.
    - Skid trees away from the road towards the interior of the stand.

- Keep logging activity in the 100 feet buffer zone to a minimum necessary to best accomplish the DFC.
- Locate landings far enough away from the road to be screened by existing vegetation.
- Locate access road intersections to the landings perpendicular to the road.

23. Mitigation for Activity in the Retention Areas in Developed Recreation Sites:
    - Leave a 100 feet buffer of understory plants along the roads, trails, or around built facilities.
    - Remove or cutting the slash in the 100 feet buffer zone to lie within two feet of the ground.
    - Skid trees away from the roads, trails, or built facilities towards the interior of the stand.
    - Keep logging activity in the buffer zone to a minimum necessary to best accomplish the DFC.
    - Locate landings far enough away from roads, trails, or built facilities to be screened by existing vegetation.
    - Locate access road intersections to landings perpendicular to the road.
    - Leave dogwoods and showy mast understory in restoration areas whenever reasonable.

24. Mitigation for Activity in the Partial Retention Zones:
    - Leave a 75 feet buffer of desirable understory plants along the road, in a manner to best accomplish the DFC along roads.
    - Removing or cutting the slash in the 75 feet buffer zone to lie within two feet of the ground along roads.
    - Skid trees away from the road towards the interior of the stand.
    - Keep logging activity in the 75 feet buffer zone to a minimum necessary to best accomplish the DFC along roads.
    - Locate landings far enough away from the road to be screened by existing vegetation.
    - Locate access road intersections to the landings perpendicular to the road.
    - Leave dogwoods and showy mast understory in partial retention areas whenever reasonable.

25. Mitigation for Activity along Trails:
    - Leave a 75 feet buffer of desirable understory plants along the trail, in a manner to best accomplish the DFC.
    - Remove or cutting the slash in the 75 feet buffer zone to lie within two feet of the ground.
    - Skid trees away from the trail towards the interior of the stand.
    - Keep logging activity in the 75 feet buffer zone to a minimum necessary to best accomplish the DFC.
    - Locate landings far enough away from the trail to be screened by existing vegetation.
    - Do not skid down trails, keep crossings to a minimum, cross only where designated.
    - Repair trail tread immediately after completion of logging activity.
    - After completion of thinning operations all skid trails and temporary roads that bisect recreational trails will be reclaimed for a distance of 25 feet.

26. Mitigation for Areas Affected by Prescribed Fire:
    - After the burning is completed all plowed fire lines bisecting roads, in retention zones and recreational trails in partial retention zones, need to be seeded. Road closures or berms will be mulched using natural forest materials.

- After the burning is completed all plowed fire lines bisecting recreational trails, in retention zones, need to be reclaimed for a distance of 25 feet from the edge of the trail. Closures or berms will not be used.
- All plowed fire lines should intersect with roads at approximately 90 degrees.

27. Mitigation for Activity in Modification Zones:
    - Remove or cut slash in a 30 feet buffer zone along permanently open roads.
    - Leave dogwoods and showy mast understory in restoration areas whenever reasonable.
28. Mitigation for Activity in Maximum Modification Zones.
    - Leave dogwoods and showy mast understory in restoration areas whenever reasonable.
29. During prescribed burn planning, identify smoke sensitive targets that may be affected by the project. Such targets include: health care facilities, airports, high volume & high speed roads, homes of persons known to have chronic respiratory illness, schools and poultry farms.
30. Prescribed burning plans should prescribe weather and burning conditions needed to direct smoke away from sensitive targets. Obvious weather considerations include wind direction and speed. Others are fuel conditions and ignition methods that maximize the amount of smoke lifted, plus weather that promotes dispersal (e.g. mixing height, transport wind speed and improbability of air mass stagnation). For some projects, even the most diligent planning will provide no option that can avoid all smoke sensitive targets. In those cases, modify the project or contact the resident/owner to see if the impact can be mitigated.
31. During the afternoon of the day before a prescribed burn is to be done, get a weather forecast to make sure the prescribed weather and burning conditions will be met. Also contact the State Forestry Commission, local fire department and local newsmonger.
32. On the morning of a prescribed burn check to see if the weather forecast is holding. If it is, begin any planned mitigation measures, light the fire, then begin monitoring the fire and smoke for unanticipated situations. Be prepared to stop ignition and/or begin suppression if unanticipated situations cannot be controlled or mitigated. Also be prepared to patrol smoke sensitive roadways through the night if the fire is still producing significant smoke at dusk.
33. Record any significant smoke management problems in the review section of the prescribed burn plan.

Comparison of Alternatives

The following tables compare the alternatives using different criteria.

Comparison of Treatments and Acres.

ALT.	Area 1 THIN ACRES	Area 1 SPB ACRES	Area 2 THIN ACRES	Area 2 SPB ACRES	Area 3 THIN ACRES	Area 3 SPB ACRES	Site Preparation	Planting	Anticipated Prescribed Fire
1	0	0	0	0	0	0	none		
2	11,102	4,669					HT, PF, or NT	none	10 years
			4,233	1,928			DC and PF	shortleaf pine	2 - 5 years
					2,808	785	DC and PF	longleaf pine	2 - 5 years
3 & 6	4,092	4,354					HT, PF, or NT	none	10 years
			2,422	1,023			DC and PF	shortleaf pine	2 - 5 years
			972	772			HT, PF, or NT	none	
		Total->	***3,394***	***1,795***					
					1,025	168	DC and PF	longleaf pine	2 - 5 years
					941	543	HT, PF, or NT	none	
				Total->	***1,966***	***711***			
4	3,978	4,354					HT, PF, or NT	none	10 years
			0	0			DC and PF		
			2,683	1,795			HT, PF, or NT	none	10 years
		Total->	***2,683***	***1,795***					
					1,025	168	DC and PF	longleaf pine	2 - 5 years
					941	543	HT, PF, or NT	none	
				Total->	***1,966***	***711***			
5	4,092	4,354					HT, PF, or NT	none	2-5&10 years*
			2,422	1,023			DC and PF	shortleaf pine	2 - 5 years
			972	772			HT, PF, or NT	none	
		Total->	***3,394***	***1,795***					
					1,025	168	DC and PF	longleaf pine	2 - 5 years
					941	543	HT, PF, or NT	none	
				Total->	***1,966***	***711***			

* 8,115 acres woodland conditions -- 1,045 acres in treatment stands

HT = handtools PF = prescribed fire DC = roller drum chop (or new methods as available) NT = no treatment

Table 2A - Comparison of Alternatives by Treatment Acres and Treatments

Comparison of Desired Future Conditions for Treatment Areas

ALT.	Area	Desired Future Conditions: Upland HDWD HDWD-Pine *	Dry and Xeric Oak Woodlands	Shortleaf/Bluestem Woodlands	Longleaf/Bluestem Woodlands
1			0	0	0
2	Area 1	15,771			
	Area 2			6,161	
	Area 3				3,593
	Total->	***15,771***		***6,161***	***3,593***
3	Area 1	8,446			
	Area 2	1,636	108	3,445	
	Area 3	1,432	52		1,193
	Total->	***11,514***	***160***	***3,445***	***1,193***
4	Area 1	8,332			
	Area 2	4,478			
	Area 3	1,432	52		1,193
	Total->	***14,242***	***52***	***0***	***1,193***
5	Area 1	7,401	1,045		
	Area 2	1,636	108	3,445	
	Area 3	1,432	52		1,193
	Total->	***10,469***	***1,205***	***3,445***	***1,193***
6	Area 1	8,446			
	Area 2	1,636	108	3,445	
	Area 3	1,432	52		1,193
	Total->	***11,514***	***160***	***3,445***	***1,193***

Table 2B - Comparison of Alternatives by Desired Future Condition

* This includes: Dry-Mesic Oak Forests, Dry and Dry-Mesic Oak-Pine Forests, and Dry and Xeric Oak Forests.

Comparison of Issues.

Issue 1. Establish and maintain fire dependent understory species in oak woodland, longleaf woodland, and shortleaf woodland ecosystems.			
Alternative 1	Alternative 2	Alternatives 3, 5, &6	Alternative 4
No treatment, no woodland conditions would be created.	Creates most acres of woodland conditions, but they are all located in Areas 2 and 3	Alts. 3 & 6 also create woodland acres in only Areas 2 and 3. Alt. 5 designates additional acres of woodlands in Area 1. Alt. 5 has best distribution of woodland acres.	Creates least amount of woodland acres and all is located in Area 3.
Issue 2. Amount of artificial regeneration.			
Alternative 1	Alternative 2	Alternatives 3, 5, &6	Alternative 4
None	Proposes 2713 acres (most of all alts.)	Proposes 1,191 acres of planting	Proposes 168 acres of planting (least of all alts.)
Issue 3. Impacts on recreational experiences and cultural values.			
Alternative 1	Alternative 2	Alternatives 3, 5, &6	Alternative 4
Would not reduce the risk of SPB and would continue to cause access and safety problems for forest visitors due to dead trees.	Would reduce SPB risk. Would thin stands in cultural areas (some user impact). Would treat stands adjacent to and near trails and forest camps (some user impact).	Would reduce SPB risk. Would *not* treat stands in cultural areas. Would treat stands adjacent to and near trails and forest camps (some user impact).	Would reduce SPB risk. Would *not* treat stands in cultural areas. Would treat stands adjacent to and near trails and forest camps (some user impact).
Issue 4. Impacts from Annosum Root Rot (ARR) and Littleleaf Disease (LLD).			
Alternative 1	Alternative 2	Alternatives 3, 5, &6	Alternative 4
No risk of ARR from thinning. Some risk in SPB Control. Risk of LLD is slight.	Potential risk of ARR from thinning. Can be mitigated. Risk of LLD slight, can be mitigated.	Fewer thinning acres than Alternative 2. Some risk, can be mitigated. Risk of LLD slight, can be mitigated	Fewer thinning acres than Alternative 3,5,or6. Some risk, can be mitigated. Risk of LLD slight, can be mitigated

Issue 5. Early successional habitat (grass/forb and shrub/seedling/sapling associations) dispersed throughout the forest.			
Alternative 1	Alternative 2	Alternatives 3, 5, &6	Alternative 4
None	Would create the most early successional habitat (woodlands), but it would all be in Areas 2 and 3.	Alts. 3 and 6 would create early successional habitat (woodlands), but it would all be in Areas 2 and 3. Alt. 5 would add woodland acres in Area 1. Alt. 5 would provide the most distribution of this type habitat.	Would create the least early successional habitat and they would occur only in Area 3.

Table 2C - Comparison of Alternatives by Significant Issues

CHAPTER 3. AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This chapter describes the existing conditions and potential environmental impacts of Alternatives 1, 2, 3, 4, 5, and 6. The main difference in potential effects between the alternatives is as follows:

- Alternative 1 would make no DFC decision, and take no action to improve forest health or begin to move the forest to a DFC.
- Alternative 2 would treat the most acres and make DFC decisions based on 3 geographic areas of the forest.
- Alternatives 3 and 6 would treat fewer acres than Alternative 2, but shortleaf and longleaf areas would be better suited to the use of fire as a tool to create and maintain the DFC.
- Alternative 4 would treat fewer acres and would not create any shortleaf/bluestem community type in Area 2.
- Alternative 5 would treat the same acres as Alternatives 3 and 6, but it also designates the creation and maintenance of woodland acres in Area 1.

As discussed below, other environmental effects would be similar due to the standards and mitigation measures to be applied (see Mitigations Common to All Alternatives in Chapter 2). Additional discussions of effects on the environment can be found in the LRMP.

3.1 Vegetation

3.1.1 Issues

The major issues related to vegetation raised during scoping were:

- Concerns about the establishment and maintenance of fire dependent understory species in oak woodland, longleaf woodland, and shortleaf woodland ecosystems.
- Concerns about artificial regeneration of pine species.
- Concerns about annosum root rot and littleleaf disease.

Proposed activities that would have an effect on vegetation include the following:

- thinning
- site preparation, which could include burning
- planting

3.1.2 Affected Environment

According to the current forest type inventory database (CISC) the Bankhead National Forest consists of 181,734 acres. Of this, approximately 176,000 acres are currently forested and can be broadly classified as about 51% southern pines and 49% hardwoods.

Following is a brief description of the community types that will be discussed in this chapter (additional information on community types is located in the Appendix).

Cove and Canyon Hardwoods (Mixed Mesophytic, Conifer-Northern Hardwoods, River Flood Plain Hardwood)

Mixed mesophytic forests occur on lower north and east facing slopes and mesic coves. Among the most common species associated with this community type are sugar maple, American beech, eastern hemlock, yellow poplar, red maple, white oak and northern red oak. No activities proposed in this project will be within this community type.

Upland Hardwood and Hardwood Pine (Dry-Mesic Oak Forests, Dry and Dry-Mesic Oak-Pine Forests)

Upland hardwood and hardwood pine are found in the Dry Mesic Oak Forest and the Dry to Dry Mesic Oak-Pine community types. The Dry Mesic Oak forests are usually found on dry, upland sites on southern and western aspects and ridge tops. The species composition of this community type varies greatly due to its wide distribution. The major species include chestnut oak, northern red oak, black oak, white oak and scarlet oak. Additional species may include southern red oak, post oak, blackjack oak, pignut hickory, mockernut hickory and red maple. Coniferous species include shortleaf pine. The American chestnut was a major species in this forest community type up until the 1930's.

Dry and Dry-Mesic Oak-pine forest community types occur on coarse textured soils on ridges and south facing slopes. The overstory species varies with location, but shortleaf pine and white oak would be the predominate canopy species in this proposed project area. Other associated species include Virginia pine, post oak, blackjack oak on dry sites and loblolly pine, southern red oak, black oak, mockernut hickory, pignut hickory and red maple on dry mesic sites.

Oak Woodlands (Dry and Xeric Oak Forests and Woodlands)

Oak woodlands occur in the Dry and Xeric Oak Forest and Woodland community types. These community types usually occur on very dry and infertile uplands. They also occur on steep, south-facing slopes or rock outcrops. The major species associated with this community type include black oak, blackjack oak, chestnut oak, scarlet oak and white oak. At the present time, there are no true oak woodlands within the Bankhead.

Shortleaf pine/bluestem Woodlands (Xeric Pine-Oak Forests and Woodlands, Dry and Dry-Mesic Oak-Pine Forests)

Shortleaf pine, in addition to occurring in the Dry and Dry-Mesic Oak-Pine forest community types, is also found in the Xeric Pine and Pine-Oak Forest community type. Loblolly, longleaf and Virginia pines are also part of this community type. Xeric pine and pine-oak forest and woodlands typically occur on ridge tops and south-facing upper slopes in the mountains or on excessively drained sandy uplands in gentler terrain. This forest community type normally exists on strongly acidic soils with extreme moisture and nutrient deficiencies. Principal overstory species of this community type include Virginia pine, shortleaf pine and chestnut oak. Associated species include scarlet oak, black oak, blackjack oak, post oak, northern red oak, southern red oak, white oak and pignut hickory. Currently, the shortleaf pine/bluestem community does not exist on the Bankhead.

Longleaf pine/bluestem Woodlands (Upland Longleaf Pine/Bluestem Woodlands)

Longleaf pine occurs in the Upland Longleaf Pine/Bluestem Forest and Woodland community type. This community type is usually restricted to sites in the mountains that are apt to burn. Specifically, these sites are the ridge tops and middle and upper slopes with south and southwest exposures. In this forest community type, the dominant tree is longleaf pine, providing relatively dense to patchy and very open canopies. Sometimes clusters of deciduous scrub oaks and mesic hardwoods are associated with this community type. The groundcover consists of hundreds of species of herbs and low shrubs dominated by bluestem grasses. Currently, the upland longleaf pine/bluestem community exists on the Bankhead only in the early stages, in stands that have been established since the mid 1980's and have been exposed to regular prescribed fire.

Southern Pine Beetle Spots

Areas heavily impacted by the southern pine beetle have vegetation which is primarily brush, including briars, hardwood sprouts and shrubs. If the southern pine beetle suppression treatment (cut and remove) created some ground disturbance, then pine seedlings and grasses may have become established in these areas. Many of these affected areas have residual overstory pine and hardwood trees, as well as standing dead and down pine trees.

Annosum Root Rot and Littleleaf Disease

In southern forests, the risk of pine root diseases are associated with soil characteristics and intensity of silviculture and management applications. The two diseases with the greatest impact on southern pine forests are annosum root disease*,* _Heterobasidion annosum_ (Fr.) Bref and littleleaf disease, _Phytophthora cinnamomi_ Rands. Annosum root disease affects primary roots and is associated with thinnings on sandy/sandy loam soils that are well drained. Risk mapping systems have been developed utilizing soil associations and depth of water table (Alexander and Anderson 1985, Froelich and others 1977). The most accurate assessment of annosum risk is site examination of soil textures and drainage patterns (Anderson and Mistretta 1982). The risk system used for evaluating annosum on the Bankhead National Forest is based on soil series descriptions of soil textures, the depth of the A horizon and the height of the water-table in relation to the soil surface (Morris and Frazier 1966). Littleleaf is a root disease complex involving a soil inhabiting fungus, _P. cinnamomi_, which affects the fine roots of shortleaf pine and to a lesser extent loblolly pine as both become predisposed by unfavorable soil and site conditions (Tainter and Baker 1996). There are two methods of determining littleleaf risk. One requires detailed field observations, while the other relies on soil maps (Oak and Tainter 1988). The risk method used in this report is based on soil maps and soil series classification with known relationships to littleleaf damaged classes. These factors include eroded clay textured soils with poor internal drainage and low fertility.

The most prevalent risk based on soil classification is for annosum root disease. Mitigation of this risk is based on the proposed treatments of moderate and high risk sites scheduled for thinning. On high risk sites the following recommendations are to be considered:

- The Bankhead NF is below the 34º N latitude and thinning in the summer months (May – August) is effective in preventing annosum infections. The summer time temperatures prevents the germination of the basidiospores on stump surfaces (Froelich and others 1977).
- Treating stumps with borax during the thinning operation is also an effective annosum prevention method. The granular borax product currently registered for stump treatment is Sporax, produced by Wilbur-Ellis Company.

Although the Bankhead falls within the historic range of littleleaf disease, most of the District's soil types do not fall within the risk categories for this disease.

Recommendations for proposed shortleaf restoration sites:

- Evaluate site/species selection based on soil complex most suitable for shortleaf and minimum risk for LL disease. On sites with clay components and poor drainage some mitigation can be considered.
- Decrease planting density. Widening of initial spacing reduces root competition and competitive stress. Decreased density delays the onset of littleleaf symptoms, lengthens rotation age, and promotes species diversity (Oak and Tainter 1988).

- Forest Health Protection Pathology staff will conduct a *Phytophthora cinnamomi* survey of soil risk sites proposed for shortleaf restorations and make further recommendations.

Old Growth

Old growth forests are ecosystems distinguished by old trees and related structural attributes. Old growth encompasses the later stages of stand development that typically differ from earlier stages in a variety of characteristics which may include three size, accumulation of large woody material, number of canopy layers, species composition, and ecosystem function.

The age at which old growth develops and the specific structural attributes that characterize old growth will vary widely according to forest type, climate, site conditions and disturbance regime. Old growth in fire-dependent forest types may not differ greatly from young forests in the number of canopy layers or accumulation of downed woody material. However, old growth is typically distinguished from younger growth by several of the following attributes:

- large trees
- wide variation to tree sizes and spacing
- accumulations of large-sized dead, standing and fallen trees
- decadence in the form of broken or deformed tops or boles and root decay
- multiple canopy layers
- canopy gaps and understory patchiness

Old growth is emphasized in areas on the district such as:

- Sipsey Wilderness
- Sipsey Wild and Scenic River
- Canyon Prescription Areas (as described in the DRLRMP)
- Proposed Back County Areas (as described in the DRLRMP)
- Cultural and Historic Areas (as described in the DRLRMP)

The DRLRMP has identified 81,302 acres that are possible old growth communities. There are no proposed treatments in old growth areas and there will be no impact to current or future old growth in these areas of the forest.

Listed below in acres, are the current forest conditions by community type and age class (see Table 3.1.2.A), in percentage of the forest by community type (Chart 3.1.2.A), and percentage of the forest by age class (Chart 3.1.2.B). (See Appendix for additional information on community types.)

Early Succession	Sapling Pole	Mid Succession	Late Succession	Old Growth	Unknown	
Cove and Canyon Hardwood and Conifer- Northern Hardwood						
0 - 10 Yrs	11- 40 Yrs	41 - 80 Yrs	81-119 Yrs	119+ Yrs	No Age	**Total Acres**
298	3106	2867	12500	1240	32	**20043**
Upland Hardwood and Hardwood Pine						
0 - 10 Yrs	11- 40 Yrs	41 - 80 Yrs	81-119 Yrs	119+ Yrs	No Age	**Total Acres**
2202	8188	7874	44468	1584	111	**64427**
Oak Woodlands						
0 - 10 Yrs	11- 40 Yrs	41 - 80 Yrs	81-119 Yrs	119+ Yrs	No Age	**Total Acres**
0	0	0	0	0	0	**0**
Longleaf Pine						
0 - 10 Yrs	11- 20 Yrs	21 - 60 Yrs	61-109 Yrs	110+ Yrs	No Age	**Total Acres**
851	562	305	288	0	0	**2006**
Shortleaf Pine						
0 - 10 Yrs	11- 20 Yrs	21 - 60 Yrs	61-109 Yrs	110+ Yrs	No Age	**Total Acres**
36	0	107	217	0	0	**360**
Loblolly Pine						
0 - 10 Yrs	11- 20 Yrs	21 - 60 Yrs	61+ Yrs		No Age	**Total Acres**
8503	5993	23370	25185		0	**63051**
Virginia Pine						
0 - 10 Yrs	11- 20 Yrs	21 - 60 Yrs	61-99 Yrs	100+ Yrs	No Age	**Total Acres**
132	15	1897	5513	111	0	**7668**
Southern Pine Beetle Spots 10 Acres and Larger						
0 - 10 Yrs	11- 40 Yrs	41 - 80 Yrs	81-119 Yrs	119+ Yrs	No Age	**Total Acres**
18577	0	0	0	0	0	**18577**
Uninventoried Lands						
0 - 10 Yrs	11- 40 Yrs	41 - 80 Yrs	81-119 Yrs	119+ Yrs	No Age	**Total Acres**
0	0	0	0	0	5602	**5602**
Grand Total Acres						
						Total Acres
30599	**17864**	**36420**	**88171**	**2935**	**5745**	**181734**

Table 3.1.2.A - Current Conditions by Community Type and Age Class

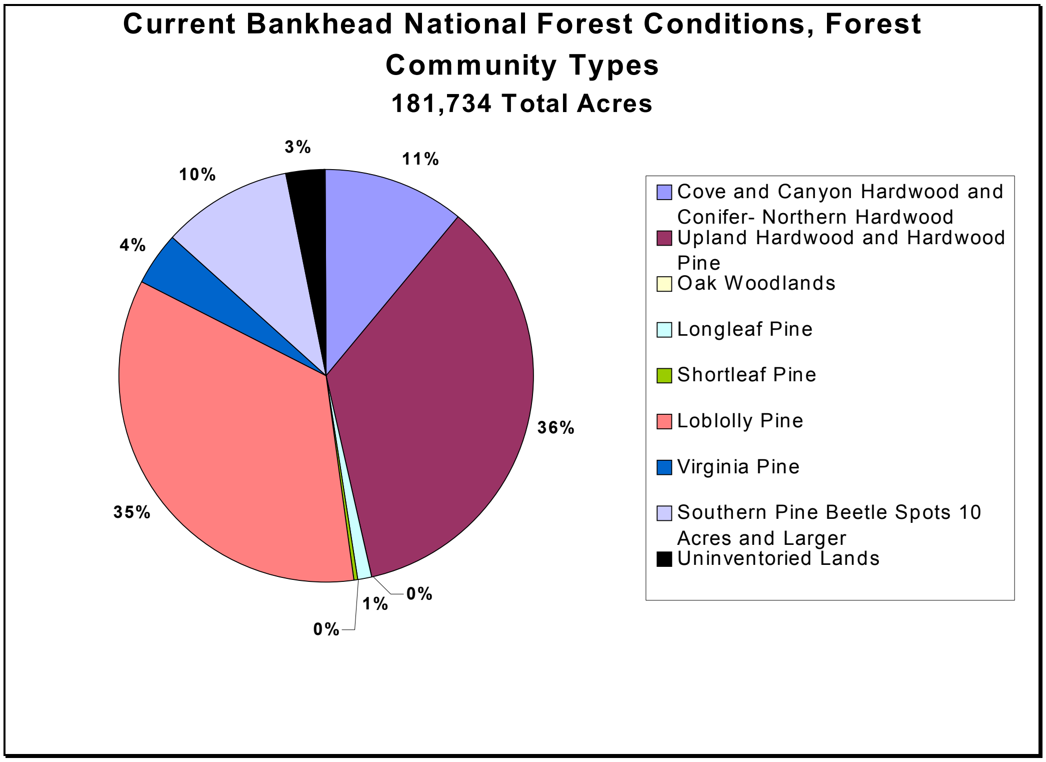


Chart 3.1.2.A - Current Conditions by Community Type

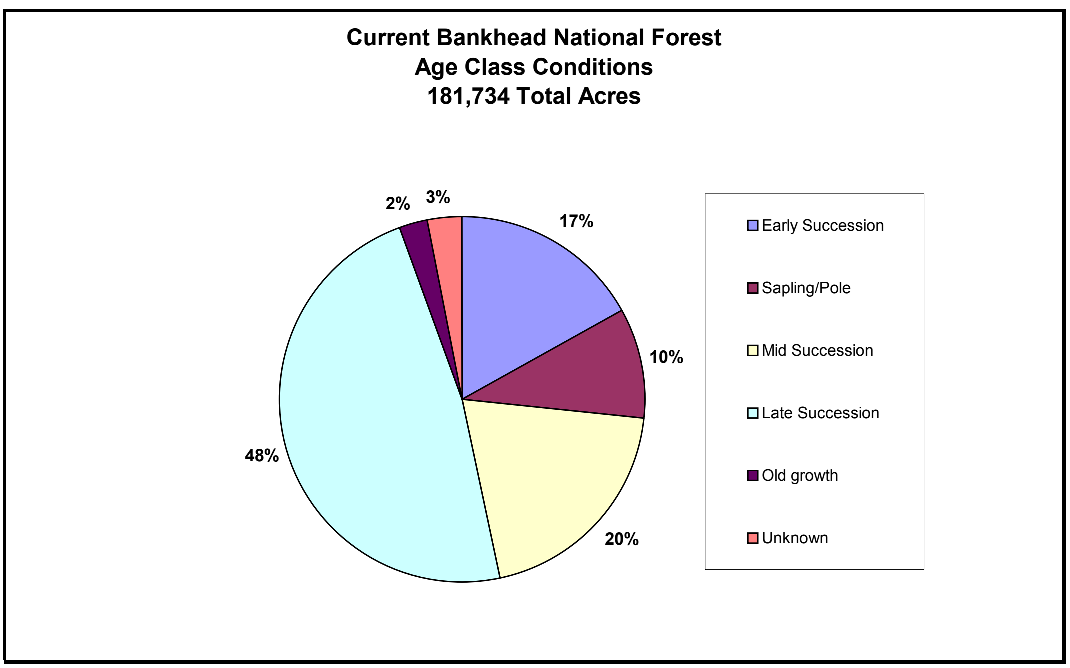


Chart 3.1.2.B - Current Conditions by Age Class

Currently there are approximately 24,163 acres of loblolly pine stands between the ages of 15 and 45 years old, and approximately 18, 577 acres (mostly in loblolly pine stands) that have been killed by SPB in recent years. These areas are distributed across the entire forest.

3.1.3 Environmental Effects

In the action alternatives (2, 3, 4, 5, 6) proposed treatments would occur in the loblolly pine stands that are 15 to 45 years of age and in the areas affected by SPB that are 10 acres and larger. These activities have the potential to cause the following direct effects to vegetation:

- disturbance of the understory plant community
- disturbance to some of the midstory plants
- potential changes in species composition of the overstory

Indirect effects could include:

- changes in the understory plant community, due to more light reaching the forest floor
- increased stand health, due to less competition for light, water, and nutrients
- vigorous sprouting from the root systems of damaged hardwoods species

Alternatives 2, 3, 4, 5, and 6 would all reduce the risk of future SPB infestations by thinning the overstocked loblolly pine stands and creating healthier stand conditions. All of these alternatives would begin the process of returning the SPB affected areas to the selected DFC.

Alternative 2 has the most overall treatment acres and would create the most acres of shortleaf/bluestem and longleaf/bluestem woodlands. This alternative would have the greatest direct effect on vegetation in the five-year period.

Alternative 4 has the least overall treatment acres and would create no shortleaf/bluestem woodland acres and the fewest acres of longleaf/bluestem woodland. This alternative would have the least effect on vegetation in the five-year period.

Alternatives 3, 5, and 6 have the same treatment acres except that Alternative 5 would create more total woodland acres than the others. The change to vegetation in these alternatives in the five-year period falls between Alternatives 2 and 4.

Alternative 1 with no treatments would allow the risk of SPB to the overstocked loblolly pine stands to increase. The SPB affected areas would be left untreated. The current vegetative conditions would be least affected by this alternative.

Alternative 1

This alternative has no proposed actions. The overstocked loblolly pine stands would still be at risk for SPB infestation and SPB populations would be expected to increase to epidemic populations over the next few years. SPB affected areas would continue to be dominated by brushy species for several years until a mixture of tree species would begin to emerge and form the beginnings of the future stands.

With this alternative we would expect to see the loblolly pine stands continue to die from SPB and other stress related maladies. The heavy understory in these stands would continue to shade the forest floor and prevent the establishment of favorable grass species. These conditions would add to the mounting fuel loading in the area and the potential for destructive wildfires would increase. As fuel loading continues to increase the ability to conduct fuel reduction prescribed burns becomes more difficult.

In the areas that have been affected by SPB the dead pine trees have either been removed, cut and left laying on the ground, or are still standing (these trees will continue to break and fall as they deteriorate). This alternative would not treat these stands and the heavy fuel loading would remain for years to come. These stands would be dominated by brushy conditions and at best sparse overstory for years.

The stands that were not treatment or were treated with the cut and leave method of SPB control would be expected to eventually begin to express the characteristics of an upland hardwood community type with the overstory dominated by yellow poplar, maple, and gum. The canopy would remain closed with a fully stocked overstory, a brushy understory, and a heavy midstory layer.

The stands that were treated with the cut and remove method of SPB control would be expected to react in the same way as the areas described above, except in spots were the duff layer was disturbed by removal operations. In these spots loblolly and Virginia pine would become reestablished and dominate those parts of the affected area. These areas would consist of yellow poplar, maple, gum, and loblolly and Virginia pine with the pine occurring in thick patches. The canopy would remain closed with a fully stocked overstory, a brushy understory, and a heavy midstory layer.

Alternative 2

This alternative proposes to treat a total of 25,525 acres. Thinning would occur on 18,143 acres and restoration of SPB affected areas would occur on 7,382 acres.

Thinning would help restore the health of these stands by removing the damaged, diseased, and suppressed trees. Thinning would open these stands up and allow more light to reach the forest floor and allow grasses and forbs to come into the understory. Logging equipment would cause much of the understory and some of the midstory to be knocked down, which would add to the opening up of the stands. Anticipated prescribed burns in some of the areas would help maintain the open conditions created by the thinning and increase the potential for grasses and forbs to become established in the understory.

In stands with a DFC of longleaf/bluestem or shortleaf/bluestem the loblolly pine would continue to be the dominate overstory tree until future thinning and possibly other treatments would create the right conditions for conversion to the desired overstory species.

In the stands with a DFC of hardwood, thinning would allow the opportunity to begin moving the overstory toward hardwood by favoring these species where they occur and removing the pine trees around them. In some cases stands can be moved from a predominately pine overstory to a mixed hardwood-pine stand with this first treatment. In other cases the dominate overstory tree would continue to be loblolly pine and the stand would be slowly converted to hardwood over time with future thinning to remove pine trees and favor the desired hardwood species as they grow into the overstory.

Restoration of the SPB areas would help restore these stands to the selected DFC. In areas selected for restoration to hardwood, treatments would involve handtools and would selectively treat to favor oak and hickory stems (both large and small) to improve their chance of survival and growth over other species such as maple and poplar. In some cases prescribed fire may be used to reduce the numbers of pine seedlings that have seeded parts of the area naturally. These treatments would open the areas up and reduce the brushy look, and may alter the current species composition. In some areas where oak and hickory stems are present in sufficient numbers no treatments would be done and the areas would be left to grow naturally.

In areas selected for restoration to shortleaf pine/bluestem, treatments would be roller drum chopping and prescribed fire to prepare the sites for planting of shortleaf pine. This treatment would knock down and grind up all stems up to about five inches in diameter. Prescribed fire would then reduce this slash further and provide for a fairly clean planting site. These treatments would remove the understory and temporarily control the sprouting of hardwood root systems, to allow for the planted seedlings to become established. These treatments would not kill most of the hardwood root systems and would not eliminate hardwoods from the site. It is anticipated that prescribed fire can be used after age six to establish and maintain open conditions that are conducive to bluestem grasses and associates. Since hardwood root systems would not be eliminated, hardwood sprouts may still create competition problems during the first six years and a release treatment may be necessary. If a release treatment is necessary that decision will be made in a separate analysis process.

In areas selected for restoration to longleaf pine/bluestem, treatments would be roller drum chopping and prescribed fire to prepare the sites for planting of longleaf pine. The effects would be the same as described above. It is anticipated that prescribed fire can be used after age three to establish and maintain open conditions that are conducive to bluestem grasses and associates. Since hardwood root systems will not be eliminated, hardwood sprouts may still create competition problems during the first three years and a release treatment may be necessary. If a release treatment is necessary that decision will be made in a separate analysis process.

Woodland conditions in this alternative would occur in Areas 2 and 3 only and would be predominately in the shortleaf and longleaf community types.

The proposed thinnings in this alternative would provide the open canopy conditions necessary for this community type. It is anticipated that prescribed fire would be used on a frequent rotation to control understory woody species and provide the needed conditions for the bluestem grasses and associated species. On these sites vegetative change would include the following:

- Wider spacing in the overstory (open canopy)
- Midstory trees would be reduced in number (open condition)
- Understory would change from predominately brush and hardwood sprouts to grasses and scattered hardwood sprouts

Desired future conditions in this alternative would have all of the community types described above. The hardwood community types would be distributed all over the forest with the majority of the acres occurring in the northern part of the forest in Area 1. The shortleaf/bluestem community type would occur in the central portion of the forest in Area 2. The longleaf/bluestem community type would occur in the southern portion of the forest in Area 3.

Upland hardwood and hardwood pine would be present in both the dry and xeric oak forest and woodland community type and the mesic oak forest and dry and mesic oak-pine forest community type. A description of these communities follows:

- The ***dry and xeric oak forest and woodland (upland hardwood and hardwood-pine)*** community type would be characterized as having canopies ranging from closed forest conditions to open woodland conditions, with occasional gaps up to ½ acre in size. Dominant overstory trees would include white oak, black oak, chestnut oak, scarlet oak, and post oak. If dormant season fire occurred in these areas, one to two times per decade tree density would be restricted and the growth of shade intolerant grasses, forbs, and shrubs would be promoted in some areas. In other areas these forests would have a well developed shrub and midstory canopy.
- The ***mesic oak forest and dry and mesic oak-pine forest (upland hardwood and hardwood-pine)*** community type would be characterized as mid to late successional forests. These forests would have a continuous dominant canopy of medium sized trees, with occasional gaps up to ½ acre in size. Dominant overstory trees would include sugar maple, beech, chestnut oak, black oak, scarlet oak, pignut hickory, mockernut hickory, shagbark hickory, loblolly pine, and shortleaf pine. American chestnut historically was a major species in this forest community. If fire occurred one or two times per decade on dry sites, fire sensitive species would be suppressed and oak regeneration would be stimulated. On mesic sites these forests would have a well-developed shrub and midstory canopy.

- The ***xeric pine-oak forest and woodland (longleaf and shortleaf/bluestem woodland)*** community type would be characterized as mid to late successional forests. These forests would have open woodland conditions, with occasional gaps up to ½ acre in size. The dominant overstory tree would be longleaf pine (Area 3) or shortleaf pine (Area 2). Other tree species that would be found at lower densities include: Virginia pine, loblolly pine, scarlet oak, chestnut oak, southern red oak, white oak, blackjack oak, and pignut hickory. If dormant and growing season fire occurred two or three times per decade, tree density would be restricted and the growth of shade intolerant native grasses, forbs, and shrubs would be promoted.

Long term DFC for the forest by community type is predicted as follows:

- Cove and Canyon Hardwood 20,444 acres
- Upland Hardwood and Hardwood Pine 111,393 acres
- Oak Woodlands 5,146 acres
- Longleaf Pine/bluestem 16,087 acres
- Shortleaf Pine/bluestem 20,996 acres
- Virginia Pine 7,668 acres
- Total District Acres 181,734 acres

The following chart shows the predicted percentages by community type for the forest for this alternative (Chart 3.1.3.A).

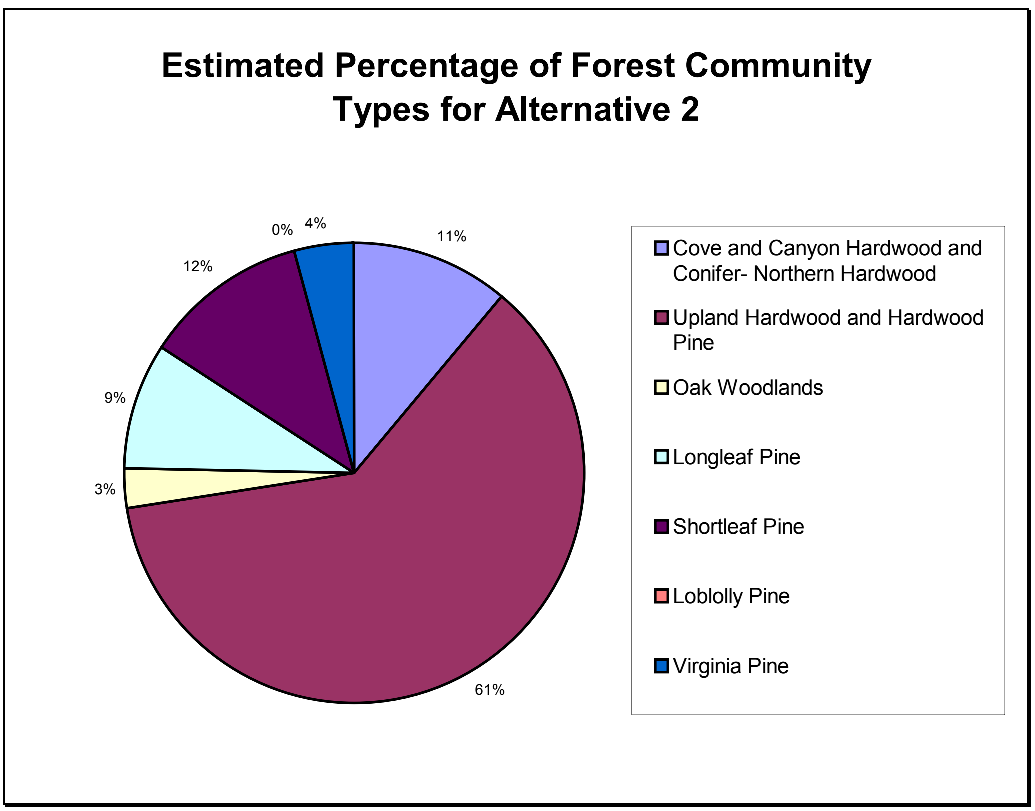


Chart 3.1.3.A - DFC for Alternative 2 by Percent of Community Type

Alternatives 3 and 6

This alternative proposes to treat a total of 16,312 acres. Thinning would occur on 9,452 acres and restoration of SPB affected areas would occur on 6,860 acres.

The effects to vegetation in these alternatives would be the same as Alternative 2 except that fewer acres would be treated in the five year period. Some sites in Areas 2 and 3 would be restored to hardwood instead of longleaf or shortleaf.

Long term DFC for the forest by community type is predicted as follows:

- Cove and Canyon Hardwood 20,444 acres
- Upland Hardwood and Hardwood Pine 130,099 acres
- Oak Woodlands 5,146 acres
- Longleaf Pine/bluestem 4,910 acres
- Shortleaf Pine/bluestem 13,467 acres
- Virginia Pine 7,668 acres
- Total District Acres 181,734 acres

The following chart shows the predicted percentages by community type for the forest (Chart 3.1.3.B).

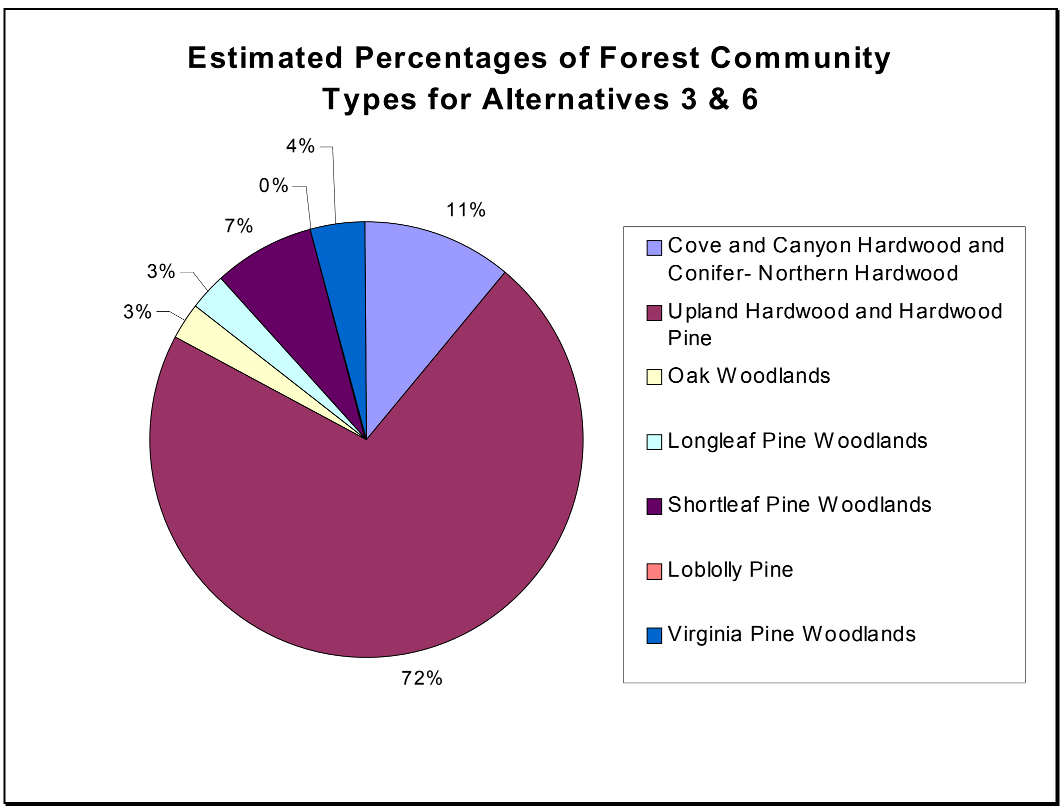


Chart 3.1.3.B - DFC for Alternatives 3 & 6 by Percent of Community Type

Alternative 4

This alternative proposes to treat a total of 15,487 acres. Thinning would occur on 8,627 acres and restoration of SPB affected areas would occur on 6,860 acres.

The effects to vegetation in this alternative would be the same as Alternative 3 for the sites to be thinned except that fewer acres would be thinned. All treatment sites in Area 2 would have a DFC of upland hardwood instead of shortleaf/bluestem and no roller drum chopping or planting of shortleaf pine would be done. It is expected that prescribed fire would occur one to two times per decade in Area 2 instead of two to three times per decade. In this alternative there would be less direct effect on the understory vegetation in Area 2 than in the other action alternatives. The amount of oak woodlands would be reduced and would only occur in Area 3.

Long term DFC for the forest by community type is predicted as follows:

- Cove and Canyon Hardwood 20,444 acres
- Upland Hardwood and Hardwood Pine 147,564 acres
- Oak Woodlands 1,148 acres
- Longleaf Pine/bluestem 4,910 acres
- Shortleaf Pine/bluestem 0 acres
- Virginia Pine 7,668 acres
- Total District Acres 181,734 acres

The following chart shows the predicted percentages by community type for the forest (Chart 3.1.3.C).

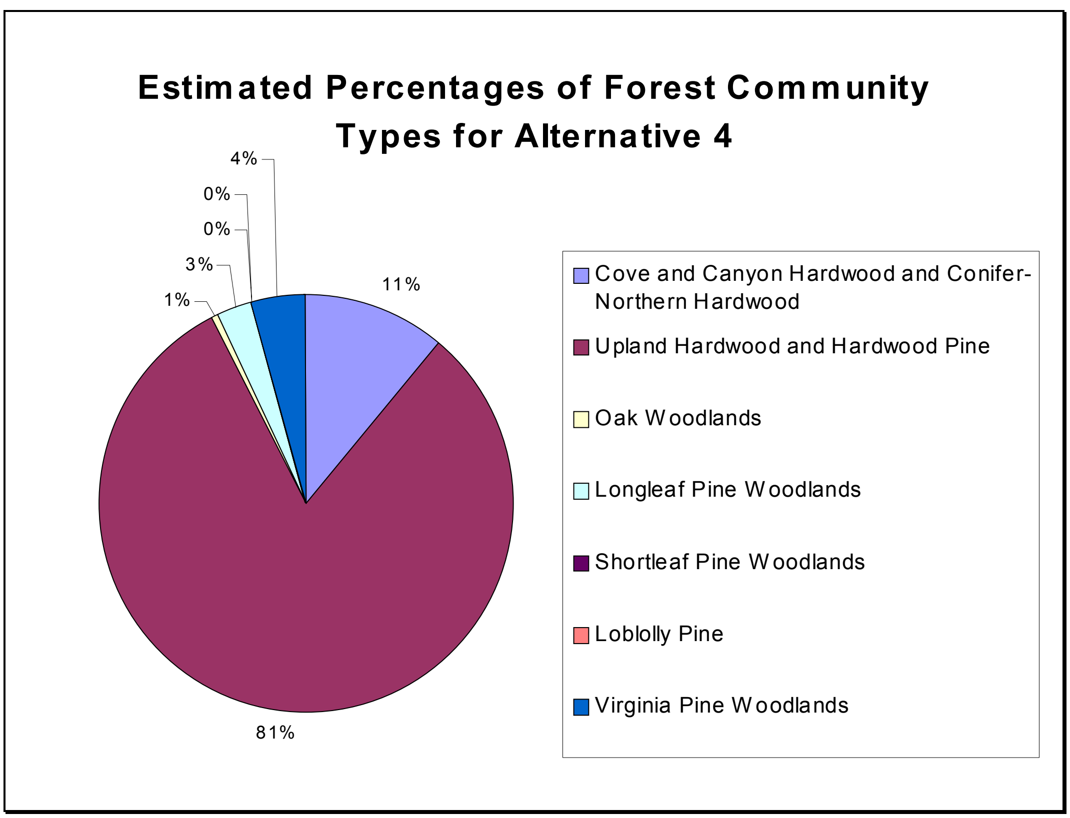


Chart 3.1.3.C - DFC for Alternative 4 by Percent of Community Type

Alternative 5

This alternative proposes to treat a total of 16,312 acres. Thinning would occur on 9,452 acres and restoration of SPB affected areas would occur on 6,860 acres.

The effects to vegetation in this alternative would be the same as Alternative 3 except that approximately 8,115 acres would be designate to be developed as oak woodlands in Area 1(see Figure 5 - Alternative 5 Map).

Long term DFC for the forest by community type is predicted as follows:

- Cove and Canyon Hardwood 20,444 acres
- Upland Hardwood and Hardwood Pine 123,203 acres
- Oak Woodlands 12,042 acres
- Longleaf Pine/bluestem 4,910 acres
- Shortleaf Pine/bluestem 13,467 acres
- Virginia Pine 7,668 acres
- Total District Acres 181,734 acres

The following chart shows the predicted percentages by community type for the forest (Chart 3.1.3.D).

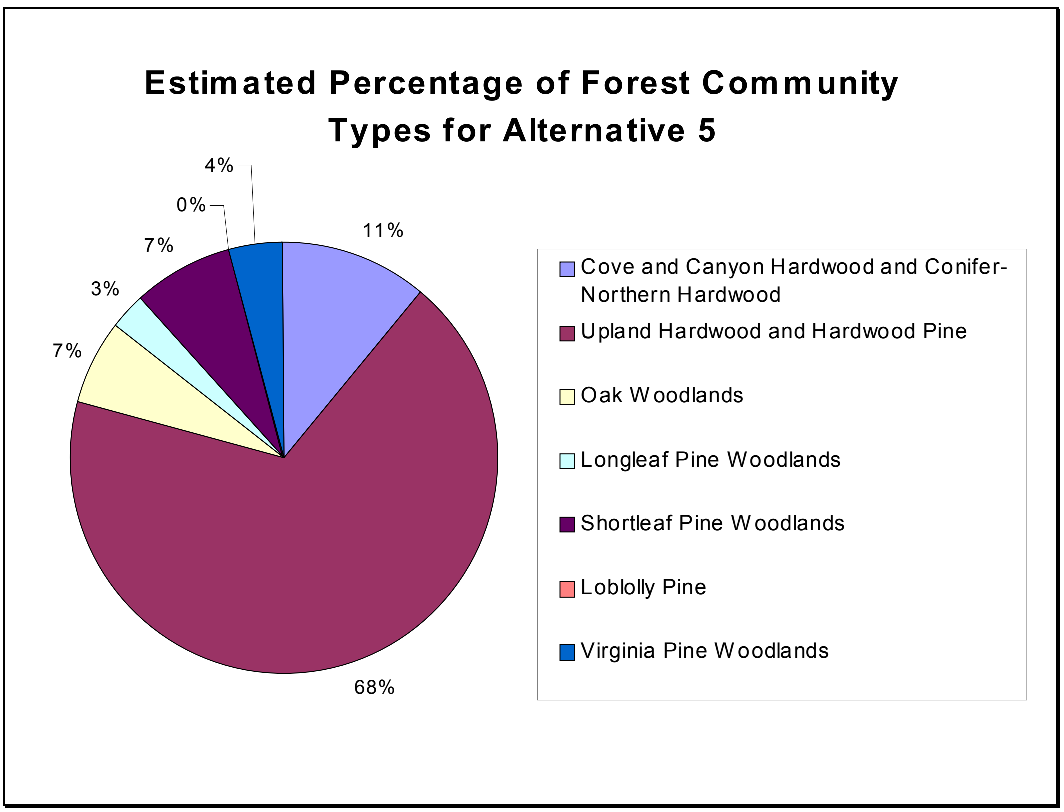


Chart 3.1.3.D - DFC for Alternative 5 by Percent of Community Type

3.1.4 Cumulative Effects (Vegetation)

There are currently many acres of loblolly pine stands that do not represent natural conditions on the Bankhead National Forest. Though loblolly pine is a naturally occurring species in this area, it did not occur naturally in homogeneous stands as it does in many instances now. These stands become susceptible to SPB attack when they are allowed to develop into overstocked stands. Thinning these stands would increase their health and vigor and the risk of attack by SPB can be substantially reduced.

Areas heavily impacted by the southern pine beetle have vegetation which is primarily brush, including briars, hardwood sprouts and shrubs. Many of these stands will need intervention to aid in achieving the selected DFC. Shortleaf and longleaf pine with grassy understories would not become established in the currently existing conditions without site preparation and planting. In stands with a DFC of hardwood, oaks may need to be released from competition so that they can eventually make it into the overstory.

Alternative 1

If no action is taken, the problems associated with the loblolly plantations between the ages of 15 and 45 years will persist. These stands would continue to be at high risk for SPB attack. Individual trees and in some cases entire stands would continue to die. The existing brushy conditions in SPB affected areas would continue to thrive for years and desired hardwood species would have heavy competition and may take years to express dominance. The district would continue to be plagued with heavy fuel loading conditions for years to come.

Establishment of forest communities that used to be a part of the Cumberland Plateau area would not be accomplished and there would be no set direction for attaining a desired future condition for the forest.

Alternatives 2, 3, 4, 5, and 6

The high risk of attack by SPB in the loblolly plantations would be reduced. These stands would be opened up and more light would reach the forest floor to stimulate growth of grasses and hardwood sprouts. This would accomplish the first step in moving toward the DFC for these stands. Vegetative disturbance and change would be limited to the area treated. Alternative 2 would have the most acres treated and Alternative 4 would have the least acres treated.

Areas affected by SPB would receive treatment according to the condition and the DFC for each particular stand. These treatments would set the stage for achieving the desired overstory component of the future and would accomplish the first step in moving these stands toward the DFC. Vegetative disturbance and change would be limited to the area treated. Alternative 2 would have the most acres treated and Alternative 4 would have the least acres treated. All of these alternatives would select a DFC for the forest and would accomplish the first step in moving the forest toward that DFC. Vegetative changes that would occur in these alternatives would be beneficial to establishing the native forest community types that make up the selected DFC for the forest.

Old growth community types would not be affected in the short term due to the fact that the areas of existing old growth and old growth potential are not being disturbed or indirectly affected by these proposals. Old growth emphasis will continue to be placed on areas such as:

- Sipsey Wilderness
- Sipsey Wild and Scenic River
- Canyon Prescription Areas (as described in the DRLRMP)
- Proposed Back County Areas (as described in the DRLRMP)

- Cultural and Historic Areas (as described in the DRLRMP)

For the long term accomplishment of DFC may provide new opportunities for old growth conditions in community types that existed naturally in the past in the Cumberland Plateau (longleaf/bluestem and shortleaf/bluestem).

3.1.5 Monitoring

Monitoring of the activities in this project would occur in a variety of ways. A certified timber sale administrator would monitor timber sale operations. A reforestation technician and/or silviculturist would monitor site preparation and planting. The district biologist and timber sale administrator would monitor stream zone protection, snag retention, compliance with bat guidelines, and erosion control measures.

Actions implemented in the project area would be monitored for compliance of Forest Standards and Guidelines (BMP's) in accordance with the LRMP. Effectiveness monitoring would be accomplished in accordance with the methodology outlined in Soil Monitoring of Logging Operations and Site Preparation Burns on National Forests in Alabama plan. This project would also be included in the Soil and Water standard and Guidelines Monitoring Plan, developed by the Forest Hydrologist, to monitor the compliance and effectiveness of Standards and Guidelines.

3.2 Soils

3.2.1 Issues

Issues related to soil resources raised during scooping with USDA Forest Service employees and the public was:

- The effects of the proposed activities on soil productivity.

The proposed activities that may impact soil productivity include:

- thinning
- site preparation
- temporary roads
- prescribed fire
- cumulative effects

3.2.2 Affected Environment

Soils within the boundaries of the proposed project are located primarily in the Sandstone Mountain Subsection with a smaller area, located to the south, being the Shale Hills and Mountain Subsection. The Sandstone Mountain Subsection is divided into five Landtype Associations (LTA); Tennessee Valley Escarpment, Tennessee Valley Plains, Sipsey Plateau, Moreland Plateau, and the Sandstone Hills. The Shale Hills and Mountain Subsection is in one LTA: Black Warrior Hills. The Tennessee Valley Escarpment and Plains LTAs have a geology made up of sandstone, shale, and limestone that weathered into sandy and clayey soils. Land surface form is characterized as strongly to moderately dissected plateau of moderate to low relief. Overstory vegetation is primarily Oak-Hickory-Cedar with pine located on sandstone derived soils. The Sipsey Plateau LTA, Moreland Plateau LTA, and the Sandstone Hills LTA have a geology made up of either sandstone or sandstone and shale that weathered into sandy or sandy and clay soils. Land surface form is strongly dissected to moderately dissected plateaus of moderately low relief. Overstory vegetation is a combination of Oak-Pine. The Black Warrior

Hills LTA has geology of shale or shale and sandstone. Soils weathered into clayey soils with some sandy soils. Land surface form is upland hills with moderately low relief. Overstory vegetation is Oak-Pine.

An Order 2 Soil Resource Inventory of the Bankhead National Forest at a 1:24,000 scale identified 13 soil map units within the proposed project boundary. No wetland (hydric) or floodplain soils are identified for any of the action alternatives. Maps and soil descriptions are available for viewing at the Ranger Station Office.

Soil Resource Inventory Map Units that apply to this area include:

- Apison-Sipsey complex, 6-20% slope
- Bankhead-Rock Outcrop-Bluff complex, 40-60% slope
- Nauvoo sandy loam, 4-12% slope
- Remlap-Talbott-Townley complex, 15-60% slope
- Sipsey sandy loam, 4-20% slope
- Smithdale sandy loam, 4-10% slope
- Tidings-Bankhead complex, 20-45% slope
- Tidings-Bankhead complex, 35-60% slope
- Tidings-Bankhead-Rock Ourcrop complex, 25-60% slope
- Townley-Apison complex, 4-15% slope
- Townley silt loam, 2-8% slope
- Townley-Tidings silt loams, 20-45% slope
- Wynnville fine sandy loam, 0-6% slope

Two soil surveys that provide insight to the soil resource on the Bankhead National Forest have occurred; one printed in 1937 in Winston County and one in 1959 in Lawrence County. Information provided in these two surveys is relevant to assist in describing the soil condition. In 1937, lands within the Bankhead NF were considered unsuitable to economically farm. There were small areas under cultivation or pasture but the primary use was forestry. All merchantable trees are described as being cut with “present tree growth found along lower slopes and streambanks”. Erosion was prominent on non-terraced farmland particularly on hillsides. Occurrences of severe erosion, where the surface soil layer was entirely lost, was best described as the time between giving up the plow and the time for broomsedge and pine trees to begin growing, taking about three years. Yearly burning is also described as a cause for erosion. Acquisition descriptions and photos taken on the forest in the 1930s show most of the Bankhead NF to be lands suitable for growing timber. Most of the land is too steep for farming. Broad ridges, particularly on the east to southeast portion of the forest have evidence of past agricultural practices. The Lawrence County soil survey published in 1959 describes the soils most eroded to be on slopes 10 percent or less due to agriculture. Both soil surveys describe the soils on the Bankhead NF as having a surface layer of sand, loam or combinations. Past erosion on the Bankhead from the 1930s to present has been slight. The 1979 Forest Service soil inventory of the Bankhead NF describes the soils as having a surface layer intact averaging 2-4 inches of surface soil over subsurface and subsoil. Compared to the previous surveys, soil surface depth has not relatively changed (excluding facility and infrastructure sites). Past erosion can therefore be considered slight since similar soil surfaces still exist. It is difficult to determine how much past erosion has occurred since there are no known records of soil surface depths recorded prior to the turn of this century on the Bankhead NF for comparison. However, the shallow soil depths indicate that soil erosion has occurred. Soils on slopes less than 20 percent were most likely farmed at some time. Soils on slopes greater than 20 percent were probably left in forested conditions. Broad ridges with slopes less than 10 percent with soils made up of the Apison, Smithdale, Townley, and Wynnville soil series have been farmed in the past. Drier soils on slopes less than 10 percent, Nauvoo and Sipsey soil series, were probably used for pasture or remained in a forested condition.

3.2.3 Environmental Effects

Soil disturbance from management practices involving timber harvest, site preparation and reforestation would result in some form of physical, chemical and biological change. Direct effects to the soil resources may include:

- changes in or loss of organic matter content
- erosion
- compaction
- nutrient leaching and/or displacement

Indirect effects May include:

- accelerated weathering
- loss of soil as sediment
- alteration of organic matter formation
- alteration of soil permeability/water infiltration

Silvicultural practices (restoration and thinning) potentially affect the soil resource primarily through nutrient removal. Proposed restoration activities do not involve a final harvest, only site preparation of SPB spots. Tree harvest proposed by all alternatives involves treatment by thinning. Proposed thinning activities would harvest the stem only leaving tree boles and needles scattered on site. Nutrient removal from thinning, when harvesting the stem only, is reduced by 50-60% (Pritchett and Fisher, 1987). Nutrient loss from stem removal is believed to be replaced by soil weathering and natural inputs (Grier et al., 1989, Jorgensen et al, 1971, Wells, 1971 and Pritchett and Fisher, 1987).

A comparison of the alternatives reveals that Alternative 1, the no action alternative, would have the least impact since no harvest treatments are proposed. Alternative 2 proposes the greatest acreage scheduled for thinning followed by Alternatives 3, 5, and 6 proposing equivalent acreage to be thinned with Alternative 4 having the least acreage scheduled for thinning. Nutrient removal can be expected, based on acres to be thinned, to be greatest for Alternative 2 and least for Alternative 4 (refer to Chart 3.3.3.A).

Temporary Roads constructed for access to proposed treatment stands and associated skid trails for thinning treatments affect the soil resource primarily through nutrient removal, soil compaction, and soil erosion. Nutrient loss occurs on temporary roads since the surface organic layer and surface soil is removed during construction. Skid trails in a thinning operation usually do not remove organic or soil surface layers therefore nutrients remain in place.

Soil compaction affects the physical property of bulk density and is dependant on soil texture, organic mater, and soil moisture content (McKee et al. 1985). The lower the bulk density range, the greater the impacts to tree growth from soil compaction. Lighter textured soils (sand) have a higher range in bulk density compared to heavier textured soils (clay). The presence of surface organic matter, tree limbs, and leaves can buffer soil compaction by providing support to equipment. Soil moisture content has a pronounced effect on soil compaction because it influences soil porosity. Soil compaction within the general forest and on skid trails used for thinning operations can be reduced by:

- identifying surface texture of the soil
- maintaining surface organic matter
- operating equipment under low soil moisture conditions

The soil on temporary roads that have the most traffic would be compacted the most. Use of standard logging equipment (skidders) can compact the soil with as few as three passes over the same ground. Specialized equipment that reduces or disperses equipment weight, such as low-pressure tires, can limit soil compaction effects. Alternative 1 proposes no treatments therefore soil compaction would not result from silvicultural activities. Comparison of Alternatives 2 thru 6 using the chart below (see Chart 3.2.3.A) shows Alternative 2 having the greatest potential for soil compaction and Alternative 4 having the least potential. Alternatives 3, 5, and 6 are equivalent. Soil compaction can be expected on temporary roads. Alternative 2 has the greatest mileage of temporary roads at an estimated 150.9 miles or approximately 220 acres. Alternative 4 proposes approximately 74.1 miles of temporary roads or approximately 108 acres. Alternatives 3, 5, and 6 propose 82.1 miles of temporary roads or an estimated 120 acres (refer to Chart 3.3.3.C). Application of mitigating measures will assist in reducing the effects of soil compaction over a three to five year period.

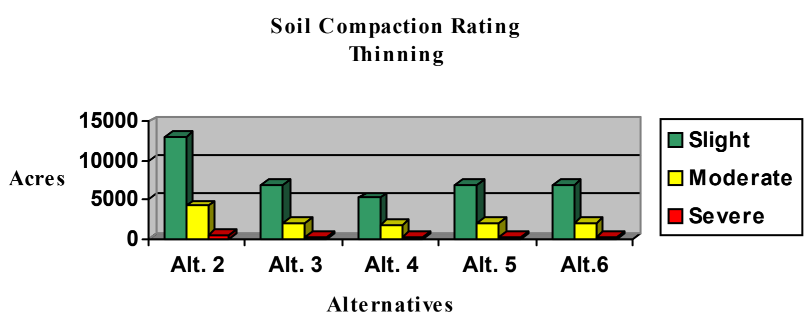


Chart 3.2.3.A - Soil Compaction Rating for Thinning

Soils that are the most susceptible to erosion are those soils that are exposed to the elements of nature (primarily rainfall) and soils located on steep slopes. Research observations and studies (Hewlett, Lull, Reinhart, et al.) on experimental watersheds have shown that soil erosion is a product of fire and/or mechanical disturbance more than from the actual harvest of trees. Monitoring (1988, 1993, 1994) has found soil exposure to occur primarily on temporary roads and skid trails with minor soil exposure off of roads and skid trails. Soil erosion from thinning operations would be low, occurring on less than 3 percent of the acreage thinned, due to expectations of very small areas of exposed soils. Comparison of Alternatives 2 thru 6 using the chart below (see Chart 3.2.3.B) shows Alternative 2 having the greatest potential for soil erosion and Alternative 4 having the least potential. Alternatives 3, 5, and 6 are equivalent.

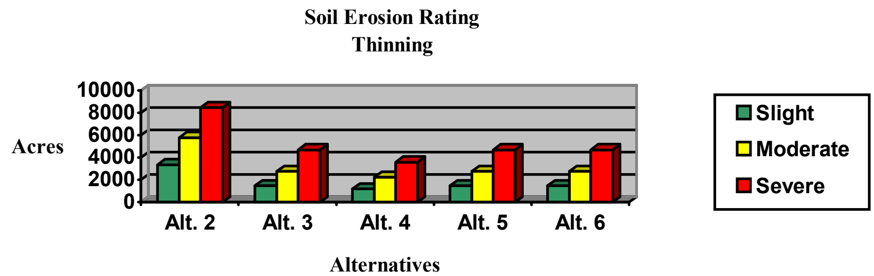


Chart 3.2.3.B - Soil Erosion Rating for Thinning

The primary source of soil erosion is temporary roads for the duration they are in use. Alternative 2 has the greatest mileage of temporary roads at an estimated 150.9 miles or approximately 220 acres. Alternative 4 proposes approximately 74.1 miles of temporary roads or approximately 108 acres. Alternatives 3, 5, and 6 propose 82.1 miles of temporary roads or an estimated 120 acres (refer to Chart 3.3.3.C). Application of mitigating measures will assist in reducing the effects of soil erosion over a two to three year period.

Mechanical site preparation, with use of a rolling drum chopper is the only mechanical form of site preparation proposed. Use of a rolling drum chopper affects the soil resource primarily through soil compaction and soil erosion. Soil compaction is minimal if soil moisture is low and surface debris and/or organic matter is present. The action of the chopper blade creating shallow indentations also assists in reducing soil compaction by breaking up the top few inches of soil. The chopper indentations also assist with water infiltration reducing soil erosion potential from rainfall runoff. Soil erosion is also expected to be minimal due to small, scattered areas of exposed soils, usually a result from the equipment (dozer) when making turns. Soil compaction and erosion potential from use of mechanical site preparation on acres under restoration are displayed in the following two charts (see Chart 3.2.3.C and 3.2.3.D).

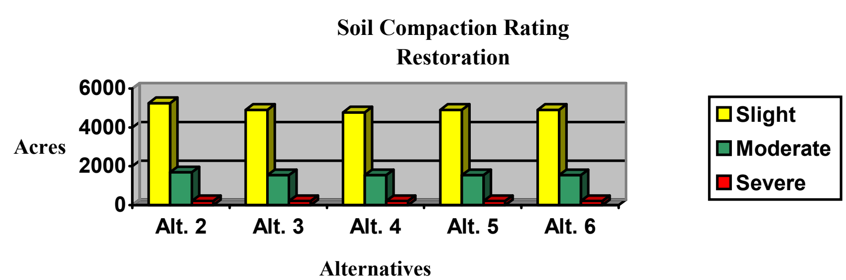


Chart 3.2.3.C - Soil Compaction Rating for Restoration

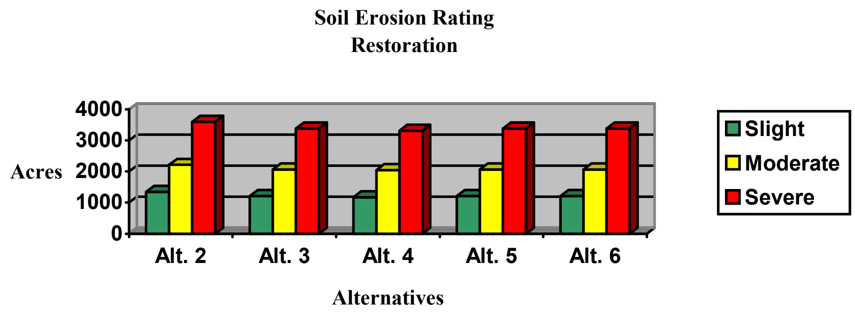


Chart 3.2.3.D - Soil Erosion Rating for Restoration

Alternative 2 proposes the greatest amount of acres to be treated with Alternative 4 having the least acres treated (refer to Chart 3.3.3.E). The relative potential for soil compaction is almost equal across all alternatives. Moderate to severe ratings reflect soil surface textures that are either loamy to clayey. These soils need to have treatments applied under dry to very dry soil conditions. Soil erosion potential is also relatively similar across Alternatives 2 thru 6.

Alternative 2 would have more acres subject to the potential for erosion than Alternatives 3, 5 and 6. Alternative 4 has the lowest potential for erosion. The moderate and severe potential rating accounts for slopes greater than 10 and 20 percent. Application of mitigating measures will assist in reducing the effects of soil erosion over a two to three year period.

Prescribed burn and site preparation burning has the potential to consume organic matter, change the surface physical properties of the soil, and kill soil biota through soil heating. Loss of organic matter results in the loss of nutrients and increases the susceptibility of a soil to erosion. Soil heating can affect soil biota and surface soil structure indirectly affecting the soils capacity to absorb water. The potential for negative effects increases with the severity of the burn. Burns that do not consume the entire surface organic layer provide the least potential for effects versus burns that consume the entire surface organic layer and are hot enough to crystallize the soil surface. Research has found that prescribed burning for 20 years in a mature southern pine stand resulted in a small increase in soil pH, organic matter, nitrogen, phosphorus, calcium, and magnesium in the surface 2-4 inches of mineral soil (Wells et al., 1971). Light burns have positive nitrogen budgets, moderate burns have neutral nitrogen budgets and severe burns have negative nitrogen budgets. Less mobile nutrient losses are negligible (VM EIS IV-93). Stone (1971) has summarized the findings of others and reports that organic matter and nitrogen contents are not reduced by light annual burns; supplies of bases and mineral nutrients are little affected, porosity and infiltration of water are not affected and hydrological effects of burning appear minor on coastal plain soils. Prescribed burning for site preparation (following burning plans) usually result in slight to moderate intensity burns. These types of burns have the potential to result in slight to moderate exposure, which is usually dispersed rather than concentrated. Monitoring of site preparation burns on ridge and valley soils, following herbicide treatment, on the Talladega National Forest (1994) revealed that 75-80 percent or more of the ground cover remained intact after a moderate site preparation burn and that exposed soils were dispersed. Natural re-vegetation occurred within two to three years on exposed soils. Soil erosion is expected to be minimal from the actual burn. The greatest risk from soil erosion occurs on constructed fire lines where soil exposure is usually necessary to maintain control of the fire. Research has found that drastic changes in soil physical properties and removal of forest floor materials sufficient to cause significant increases in erosion rates can be expected from severe fires or on sites where the combination of slope, soil and rainfall pose high risk. Severe burns can result in serious erosion resulting from large areas of exposed soils. Soil texture and surface properties are not affected by slight to moderate burns. Slight to moderate burns usually do not affect organic matter but surface litter and duff can be partially or totally consumed. Severe burns can consume organic matter and alter the soil physical properties. Alteration of soil physical properties can result in loss of soil porosity, water holding capacity, and infiltration. Soil biota can be destroyed. Comparison of burns by alternative (refer to Charts 3.3.3.G and 3.3.3.H) reveals Alternative 2 to have the greatest acreage of proposed site preparation burning, Alternatives 3, 5, and 6 are similar in acreage amounts proposed, and Alternative 4 having the least. No site preparation burning occurs under Alternative 1. Prescribed burning would continue at the present level under Alternative 1. Prescribed burning would continue at the present level under Alternative 2. Alternative 5 anticipates the greatest acreage of prescribed burning followed by Alternative 3 and 6. Alternative 4 anticipates the least amount of prescribed burning acres. Implementation of standards for erosion control on fire lines will mitigate soil erosion. Following standards outlined in prescribed burn plans will avoid severe burns.

Hand tool use for site preparation (refer to Chart 3.3.3.K) is also proposed. The use of hand tools for site preparation has no potential for direct/indirect impacts to the soil resource.

Reforestation by hand planting (refer to Chart 3.3.3.M) is proposed. Hand planting of trees has no potential for direct/indirect impacts to the soil resource.

Alternative 1

Effects to the soil resource are a result of ground disturbing activities. This alternative proposes no new ground disturbing activities. The current influences of Southern Pine Beetle infestations can be expected to continue to some degree and the resulting control activities would continue to impact the soil resource.

Alternative 2

This alternative proposes activities on the greatest amount of acres of all the action alternatives resulting in the greatest potential for effects to the soil resource. This alternative proposes thinning on 18,143 acres and 150.9 miles of temporary roads providing access. Restoration activities are planned on 7,382 acres. Site preparation, associated with restoration is proposed as follows:

- drum chopping on 2,713 acres
- site preparation burns on 4,298 acres
- hand tools on 4,403 acres

Prescribed burns are anticipated on approximately 11,000 acres (including site preparation burns). The potential for soil erosion is of concern on temporary roads, site preparation burns and fire lines. The potential for soil compaction is of concern on soil rated as severe during moist to wet soil conditions. Application and maintenance of mitigating standards should mitigate impacts to the soil resource within acceptable limits.

Alternative 3

This alternative proposes activities on less acres than Alternative 2, more acres than Alternative 4, and equivalent acres to Alternatives 5 and 6. The proposed action plans for thinning 9,452 acres and 82.1 miles of temporary roads providing access. Restoration activities are planned on 6,860 acres. Site preparation, associated with restoration is proposed as follows:

- drum chopping on 1,191 acres
- site preparation burns on 2,859 acres
- hand tools on 5,669 acres

Prescribed burns are anticipated on approximately 11,000 acres (including site preparation burns). The potential for soil erosion is of concern on temporary roads, site preparation burns and fire lines. The potential for soil compaction is of concern on soil rated as severe during moist to wet soil conditions. Application and maintenance of mitigating standards should mitigate impacts to the soil resource within acceptable limits.

Alternative 4

This alternative proposes activities on the least amount of acres of all the action alternatives resulting in the least potential for effects to the soil resource. The proposed action plans for thinning 8,627 acres and 74.1 miles of temporary roads providing access. Restoration activities are planned on 6,833 acres. Site preparation, associated with restoration is proposed as follows:

- drum chopping on 168 acres
- site preparation burns on 1,777 acres
- hand tools on 6,665 acres

Prescribed burns are anticipated on approximately 6,400 acres (including site preparation burns). The potential for soil erosion is of concern on temporary roads, site preparation burns and fire lines. The potential for soil compaction is of concern on soil rated as severe during moist to wet soil conditions. Application and maintenance of mitigating standards should mitigate impacts to the soil resource within acceptable limits.

Alternative 5

This alternative proposes activities on fewer acres than Alternative 2, more acres than Alternative 4, and equivalent acres to Alternatives 3 and 6. The proposed action plans for thinning 9,452 acres and 82.1 miles of temporary roads providing access. Restoration activities are planned on 6,860 acres. Site preparation, associated with restoration is proposed as follows:

- drum chopping on 1,191 acres
- site preparation burns on 2,859 acres
- hand tools on 5,669 acres

Prescribed burns are anticipated on approximately 12,000 acres (including site preparation burns). The potential for soil erosion is of concern on temporary roads, site preparation burns and fire lines. The potential for soil compaction is of concern on soil rated as severe during moist to wet soil conditions. Application and maintenance of mitigating standards should mitigate impacts to the soil resource within acceptable limits.

Alternative 6

This alternative proposes activities on fewer acres than Alternative 2, more acres than Alternative 4, and equivalent acres to Alternatives 3 and 5. The proposed action plans for thinning 9,452 acres and 82.1 miles of temporary roads providing access. Restoration activities are planned on 6,860 acres. Site preparation, associated with restoration is proposed as follows:

- drum chopping on 1,191 acres
- site preparation burns on 2,859 acres
- hand tools on 5,669 acres

Prescribed burns are anticipated on approximately 11,000 acres (including site preparation burns). The potential for soil erosion is of concern on temporary roads, site preparation burns and fire lines. The potential for soil compaction is of concern on soil rated as severe during moist to wet soil conditions. Application and maintenance of mitigating standards should mitigate impacts to the soil resource within acceptable limits.

3.2.4 Cumulative Effects (Soil)

Cumulative effects are changes in soil productivity. Research concludes that most soils could replace the nutrients in a harvested area without a long-term decrease in soil productivity (Grier et al., Jorgensen and Wells, Pritchett and Fisher). Comparison for soil compaction hazard rating results in very little difference between the action alternatives. Cumulative effects from soil compaction are not expected on 73 to 74 percent of the acreage (slight hazard rating) for all action alternatives. Approximately 23 to 24 percent of the acreage (moderate hazard rating) can expect some soil compaction primarily on skid trails, loading decks, and temporary roads. Approximately 3 percent of the acreage (severe hazard rating) can expect severe soil compaction generally located on skid trails, loading decks, and temporary roads. On average, 10 percent or less acreage consists of skid trials, loading decks and temporary roads. They are usually used again upon re-entry to the stand for future management needs. Application of mitigating measures to skid trails, loading decks, and temporary roads involving scarifying the ground, fertilizing, and planting grasses will aid in reducing the effects from soil compaction over a 2 to 3 year period as vegetation is established. Effects from soil compaction, particularly on temporary roads, are not expected to fully recover due to the expectation of being used again with future entry for vegetative management. Cumulative effects from soil erosion are not expected on 16 to 18 percent of the acreage (slight hazard rating) for all action alternatives. Approximately 31 to 32 percent of the acreage has the potential for moderate soil erosion primarily located on temporary roads, skid trails and site preparation burn sites. The potential for severe erosion exists on approximately 51 to 52 percent of the acreage for all action alternatives. Severe erosion potential is primarily associated with temporary roads and skid trails. Application of mitigating measures will be needed to assist with reducing soil erosion. Soil erosion is expected to last from 2 to 3 years.

Erosion values were determined using a sediment model developed by Alan Clingenpeel and is discussed under section 3.3.5 Cumulative Effects for Water Resources. Results of the model, displaying soil erosion increases in percent above baseline for all alternatives, are displayed below. (See Chart 3.2.4.A)

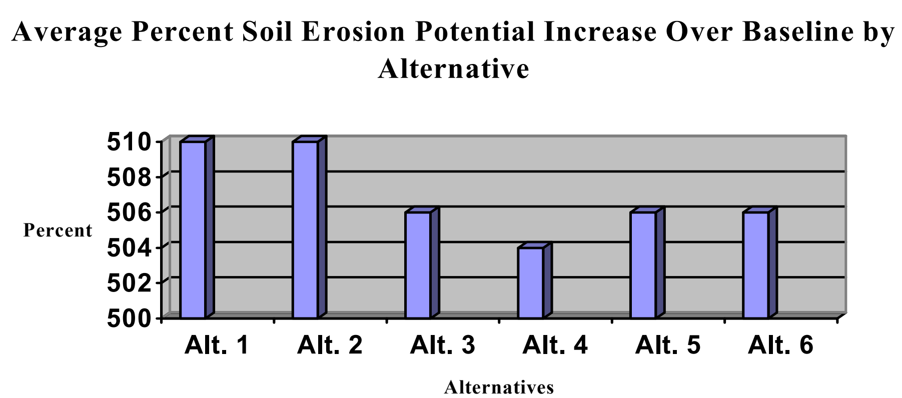


Chart 3.2.4.A - Soil Erosion Potential Over Baseline

Alternative 1 does not propose any actions. The increase in potential soil erosion is based on the 2001 and 2002 SPB activity. Given that it is projected that an average 2,476 acres per year over five years would be affected by SPB requiring some form of treatment. Over the five-year period, a total of 12,380 acres may require treatment for SPB infestation. Treatment assumes harvesting (cut and remove) and cut and leave methods. This type of activity would involve providing access through use of temporary roads, skid trails, and loading decks plus possible associated site preparation equivalent to proposed site preparation under Alternatives 2 thru 6. Based on this assumption, selection of Alternative 1 (No Action) has the potential for effects to the soil resource in the form of soil compaction and soil erosion comparable to Alternative 3, 5, and 6. A second assumption is selecting one of the action alternatives (2-6) would provide treatments to reduce/prevent SPB infestations that are projected to occur under Alternative 1. Cumulative effects to the soil resource from past SPB activity in 2001 and 2002 are expected to continue thru 2004 and 2005. Sites proposed for restoration under Alternatives 2 through 6 propose site preparation of past SPB sites. Cumulative effects from the use of site preparation burn and rolling drum chopper would extend the recovery time for soil erosion and soil compaction past the years 2007 and 2008.

No long-term loss of soil productivity is expected. No permanent roads or other permanent facilities are planned under any action alternative. Short-term soil loss is expected on temporary roads, areas of site preparation burn, and fire lines.

3.2.5 Monitoring

The proposed project area will be monitored for compliance with Forest standards (Best Management Practices) in accordance with the current Forest Land Management Plan. During vegetation operations, roads and skid trails account for more than 95 percent of the effects to soil productivity followed by site preparation which accounts for approximately 3 percent of the effects on soil productivity. An implementation and effectiveness monitoring plan of Forest standards (BMPs) for roads, skid trails, and site preparation methods will be developed and implemented.

This project will be included in the Soil and Water Standard and Guidelines Monitoring Plan, developed by the Forest Hydrologist, to monitor the compliance and effectiveness of Standards and Guidelines.

3.3 Water Quality

3.3.1 Issues

The major issue related to water quality raised during scoping with USDA Forest Service employees and the public, were concerns of the effects of sedimentation on water quality from proposed activities. The proposed activities of concern were thinning, site preparation, temporary roads, prescribed fire and cumulative effects.

3.3.2 Affected Environment

The proposed management activities would take place within eleven 5th level watersheds. Upper Sipsey Fork, Upper Brushy Creek, Upper Rock Creek, Lower Brushy Creek, Lower Sipsey Fork, Clear Creek, and Lewis Smith are within the Black Warrior Basin. Upper Bear Creek, Town Creek, West Flint Creek, and Crowdabout Creek are within the Tennessee River Basin. The size and the scope of the analysis area would vary by alternative. Alternative 2, the Proposed Action would have activities on the afore mentioned eleven 5th level watersheds, while Alternatives 3, 4, 5, and 6 would have activities within 9 5th level watersheds. The excluded watersheds from Alternatives 3, 4, 5, and 6 are Crowdabout and West Flint. Specific information on the relationship between Basins and 4th and 5th level HUCS as well as ownership are found in Table 3.3.2.A below.

MGTARE	BASIN	HUC4 Name	HUC4	HUC5 NAME	HUC5	%FSOWN	%PVTOWN	ACRES
BK	Black Warrior	Sipsey Fork	03160110	Upper Sipsey Fork	03160110010	86.66	13.34	84661
BK	Black Warrior	Sipsey Fork	03160110	Upper Brushy Creek	03160110030	82.26	17.74	56429
BK	Black Warrior	Sipsey Fork	03160110	Upper Rock Creek	03160110080	6.43	93.57	56327
BK	Black Warrior	Sipsey Fork	03160110	Lower Brushy Creek	03160110040	35.68	64.32	32982
BK	Black Warrior	Sipsey Fork	03160110	Lower Sipsey Fork	03160110020	32.23	67.77	55417
BK	Black Warrior	Sipsey Fork	03160110	Clear Creek	03160110060	13.81	86.19	23799
BK	Black Warrior	Sipsey Fork	03160110	Lewis Smith	03160110070	10.97	89.03	50168
BK	Tennessee	Bear	06030006	Upper Bear Creek	06030006010	2.22	97.78	183917
BK	Tennessee	Pickwick Lake	06030005	Town Creek	06030005040	2.12	97.88	160803
BK	Tennessee	Wheeler	06030002	West Flint Creek	06030002360	15.99	84.01	75712
BK	Tennessee	Wheeler	06030002	Crowdabout Creek	06030002340	1.50	98.50	31277

Table 3.3.2.A - Affected Watersheds

Map of the Watersheds within the Affected Environment

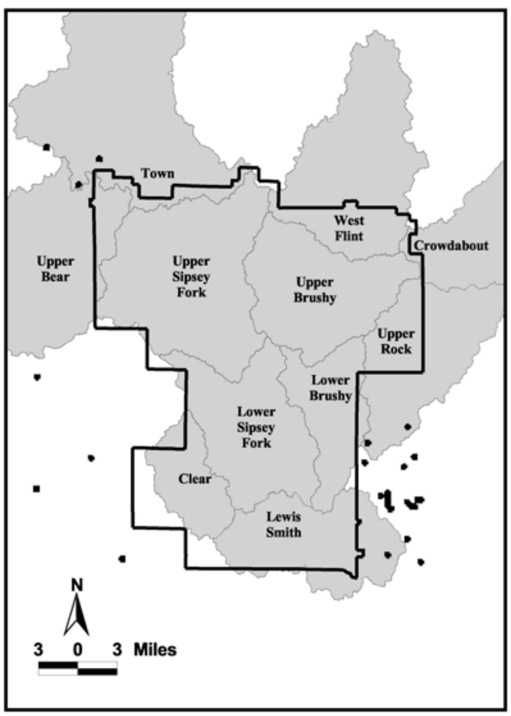


Figure 3.3.2A - Watershed Map

The Bankhead National Forest is a well-forested area as reflected in the land-use patterns of the watersheds. Forest cover is the predominant land use. Agriculture was the next leading land use practice with urbanization (which includes commercial and industrial areas) a distant third. The quality of the waters flowing from the Bankhead National Forest is typically high. Alabama

Department of Environmental Management's (ADEM) highest use designations cover two of the streams coming from National Forest lands within many watersheds. The highest state use designation, Outstanding National Resource Waters, was applied to streams entirely on National Forest lands. Point sources of pollution are generally downstream of National Forest lands and are relatively unaffected by Forest Service management. None of the streams on National Forest lands are listed as impaired and those downstream of National Forest lands are impaired for reasons beyond Forest Service influence (i.e. organic enrichment, siltation, and pathogens from pastures). (Kopaska-Merkel and Moore, 2000.) ADEM's designated uses can be found in the Table 3.3.2.B.

Alabama Department of Environment Management Water Use Designations

MgtAre	Basin	5th HUC	Name	Stream	Classification
BK	Tennessee River	6030005040	Town Creek	Town Creek	F&W
BK	Tennessee River	6030006010	Upper Bear Creek	Bear Creek	F&W
BK	Warrior River	3160110060	Clear Creek	Clear Creek	PWS/F&W
BK	Warrior River	3160110070	Lewis Smith	Lake Lewis Smith	S/F&W
BK	Warrior River	3160110070	Lewis Smith	Clear Creek	PWS/F&W
BK	Warrior River	3160110040	Lower Brushy	Lake Lewis Smith	S/F&W
BK	Warrior River	3160110020	Lower Sipsey Fork	Sipsey Fork	F&W*
BK	Warrior River	3160110020	Lower Sipsey Fork	Lake Lewis Smith	S/F&W
BK	Warrior River	3160110020	Lower Sipsey Fork	Sandy Creek	F&W
BK	Warrior River	3160110020	Lower Sipsey Fork	Curtis Mill Creek	PWS/F&W
BK	Warrior River	3160110080	Upper Rock	Rock Creek	F&W
BK	Warrior River	3160110010	Upper Sipsey Fork	Sipsey Fork	F&W*

OAW - Outstanding Alabama Water

PWS –Public Water Supply

S – Swimming and Other Whole Body Water – Contact Sports

F&W – Fish and Wildlife

* - Special Designation of Outstanding National Resource Water

Table 3.3.2.B - Water Use Designations

3.3.3 Environmental Effects

Silvicultural practices (restoration and thinning) are known to potentially affect water quality, water quantity, channel morphology, and downstream designated uses. Restoration activities proposed in all alternatives do not involve a final harvest, only site preparation of previously treated Southern Pine Beatle Spots. Therefore only the effects of thinning will be analyzed. Thinning has the potential to cause the following direct effects: erosion, changes in ground cover condition, and changes in stand composition of streamside forest communities (Golden et al., 1984: Ursic, 1991; Belt et al., 1992; Brown and Binkley, 1994). Indirect effects could include sedimentation, changes in stream nutrient levels (particularly nitrates) increases in water yield, and changes in stream flow behavior (Golden et al., 1984; Brown and Binkley, 1994).

A comparison of alternatives obviously reveals that the no action alternative, Alternative 1 has the least impact from thinning activities, followed by Alternative 4, Alternatives 3, 5, and 6 with

Alternative 2 showing the largest potential for impacts based upon acres to be thinned. (See Chart 3.3.3.A)

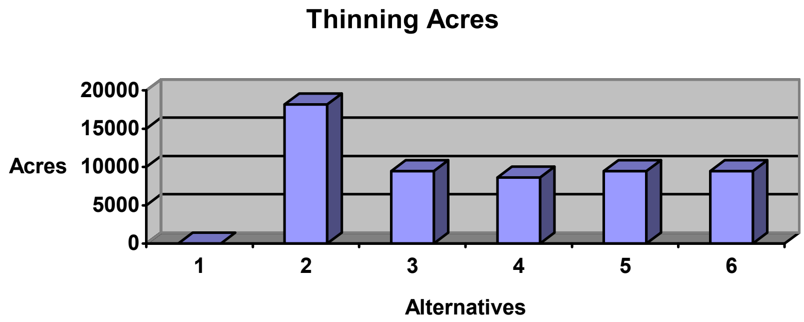
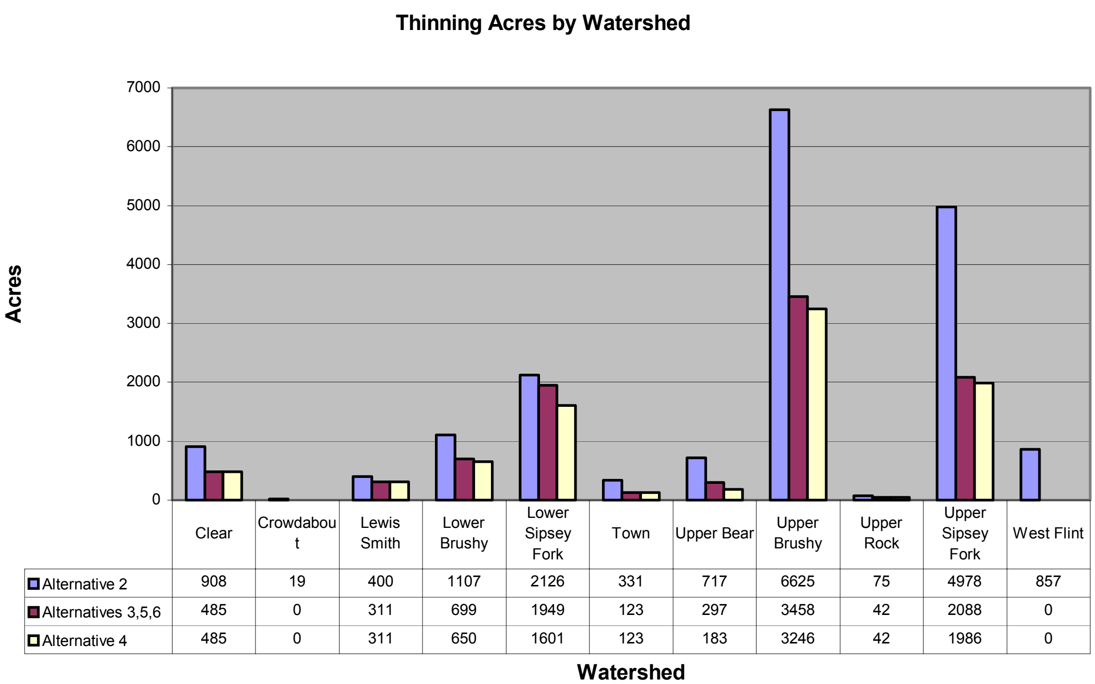


Chart 3.3.3.A - Potential Impacts to Water From Thinning

A comparison of Alternatives by watersheds reveals that 11 5th level watersheds have some potential for impacts from thinning under Alternative 2 while Alternatives 3, 4, 5, and 6 have potential impacts for only nine 5th level watersheds. The two watersheds dropped under Alternatives 3, 4, 5, and 6 are West Flint and Crowdabout. The Upper Brushy and the Upper Sipsey Fork Watersheds show the greatest potential for impacts. (See Chart 3.3.3.B)



	Clear	Crowdabout	Lewis Smith	Lower Brushy	Lower Sipsey Fork	Town	Upper Bear	Upper Brushy	Upper Rock	Upper Sipsey Fork	West Flint
Alternative 2	908	19	400	1107	2126	331	717	6625	75	4978	857
Alternatives 3,5,6	485	0	311	699	1949	123	297	3458	42	2088	0
Alternative 4	485	0	311	650	1601	123	183	3246	42	1986	0

Chart 3.3.3.B - Proposed Thinning Acres by Watershed

Temporary roads associated with thinning are also known to potentially affect water quality, water quantity, channel morphology, and downstream designated uses. State Best Management Practices as well as Forest-Wide standards will be applied to these roads as mitigation measures.

Here again the No Action Alternative would have the least impact because there would be no thinning therefore no roads. Alternative 2 has the greatest potential for impact. Alternatives 3, 5, and 6 have a significantly less potential for impacts and Alternative 4 has even less potential for erosion. (See Chart 3.3.3.C)

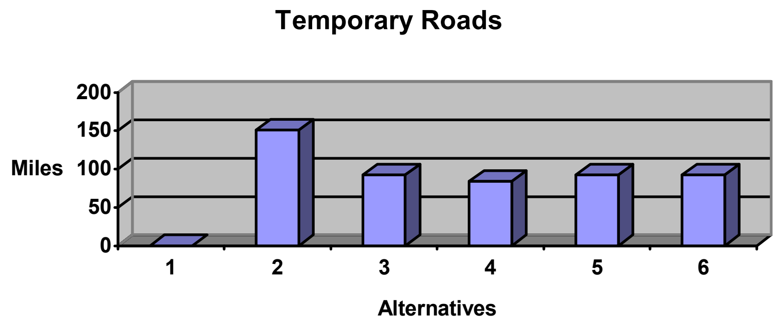
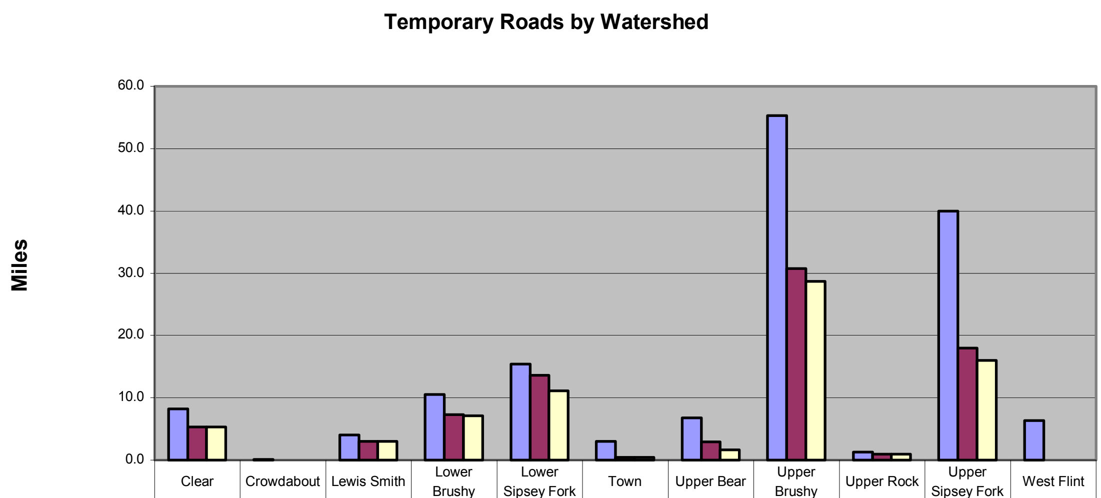


Chart 3.3.3.C - Potential Impacts to Water From Temporary Roads

A comparison of Alternatives by watersheds reveals that 11 5th level watersheds have some potential for impacts from thinning under Alternative 2 while Alternatives 3, 4, 5, and 6 have potential impacts for only nine 5th level watersheds. The two watersheds dropped under Alternatives 3, 4, 5, and 6 are West Flint and Crowdabout. The Upper Brushy and the Upper Sipsey Fork Watersheds show the greatest potential for impacts. (See Chart 3.3.3.D)



	Clear	Crowdabout	Lewis Smith	Lower Brushy	Lower Sipsey Fork	Town	Upper Bear	Upper Brushy	Upper Rock	Upper Sipsey Fork	West Flint
Alternative 2	8.2	0.1	4.0	10.5	15.4	3.0	6.8	55.3	1.3	40.0	6.3
Alternatives 3,5,6	5.3	0.0	3.0	7.3	13.6	0.4	2.9	30.7	0.9	18.0	0.0
Alternative 4	5.3	0.0	3.0	7.1	11.1	0.4	1.6	28.7	0.9	16.0	0.0

Watershed

Chart 3.3.3.D - Proposed Temporary Roads by Watershed

Drum chopping is the only heavy mechanical site preparation proposed. Direct effects from heavy mechanical site preparation (drum chopping, shear and windrowing) are potential changes in ground cover, increased exposure of soil, surface soil compaction from equipment and exposure of subsurface soil layers as a result of shearing operation (Blackburn et al., 1985). Indirect effects are potential increases in sediment, storm flows, nutrient levels in the water column and surface storage of runoff water (VM EIS IV-112). Drum chopping typically causes little to no adverse effects upon the water, shear and windrow may. Alternative 2 has the highest potential for impact. Alternative 2 shows the greatest potential for impact, Alternatives 3, 5, and 6 show significantly less possibility for impacts, and Alternative 4 shows even less potential for impacts. (See Chart 3.3.3.E)

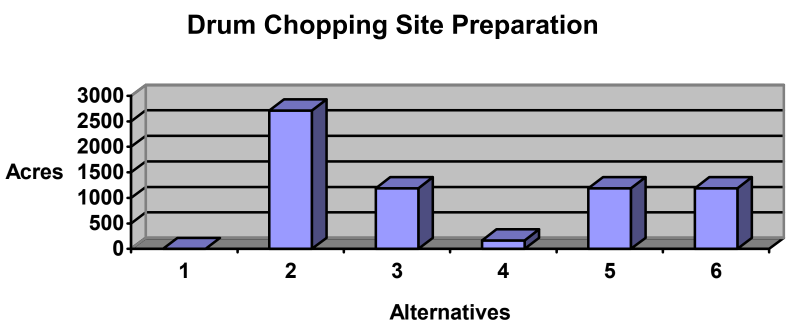
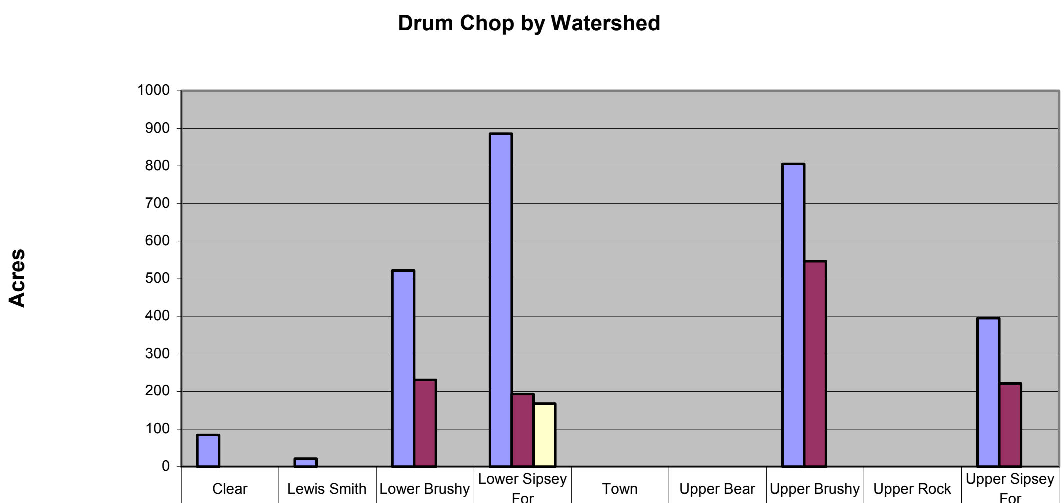


Chart 3.3.3.E - Proposed Acres of Roller Drum Chopping

A comparison of the alternatives by watershed reveals that 6 watersheds have proposed drum chopping under Alternative 2, four watersheds have proposed drum chopping under Alternatives 3, 5, and 6, and only one watershed has proposed drum chopping under Alternative 4. In Alternative 2, the Lower Sipsey has the greatest potential for impacts from drum chopping. Under Alternatives 3, 5, and 6, Upper Brushy shows the greatest potential for impacts. (See Chart 3.3.3.F)



	Clear	Lewis Smith	Lower Brushy	Lower Sipsey For	Town	Upper Bear	Upper Brushy	Upper Rock	Upper Sipsey For
Alternative 2	84	21	522	886	0	0	805	0	395
Alternatives 3,5,6	0	0	231	193	0	0	546	0	221
Alternative 4	0	0	0	168	0	0	0	0	0

Alternatives

Chart 3.3.3.F - Roller Drum Chop Acres by Watershed

Site preparation and/or prescribed burns are proposed or anticipated under all alternatives. Alternative 1 would continue the present level of prescribed burns but would have no site preparation burns. Alternatives 2, 3, 4, 5, and 6 would have site preparation burns and prescribed burns are anticipated at varying intervals. Direct effects from prescribed burning and under burns are potential changes in ground cover and increase in the hydrophobicity (water repellency) of a soil as well as erosion from plowed fire lines (VM EIS, Appendix B; Shahlaee et al., 1991). The severity of indirect effects depends on the intensity of the fire. Indirect effects are potential increase in sediment, storm flows and nutrient levels in the water column (VM EIS, IV-114). Alternative 2 shows the most potential for impacts from site preparation burning, Alternatives 3, 5, and 6 show the next highest amounts from site preparation burns. Of the action alternatives, Alternative 4 shows the lowest potential for impacts from site preparation burns, Alternative 5 shows the highest potential for impacts from anticipated prescribed burns. Alternatives 3 and 6 have the next highest with Alternative 1 only slightly lower, and Alternative 4 showing the lowest of all alternatives for anticipated prescribed burns. (See Charts 3.3.3.G & 3.3.3.H)

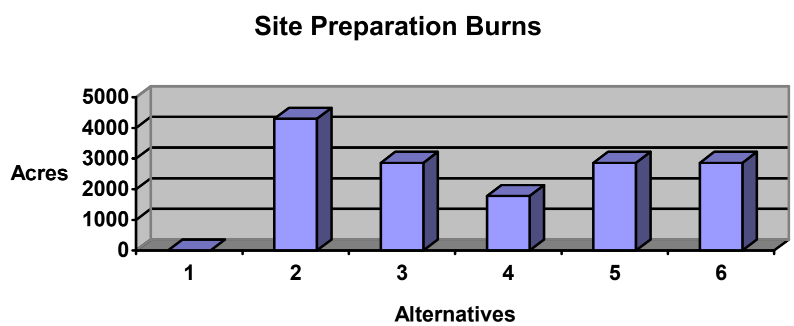


Chart 3.3.3.G - Proposed Acres of Site Preparation Burns

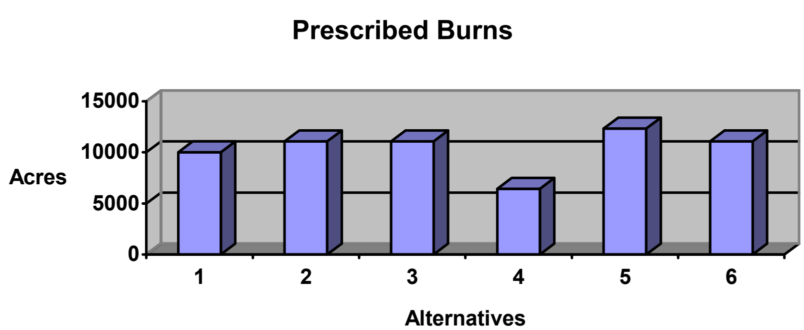
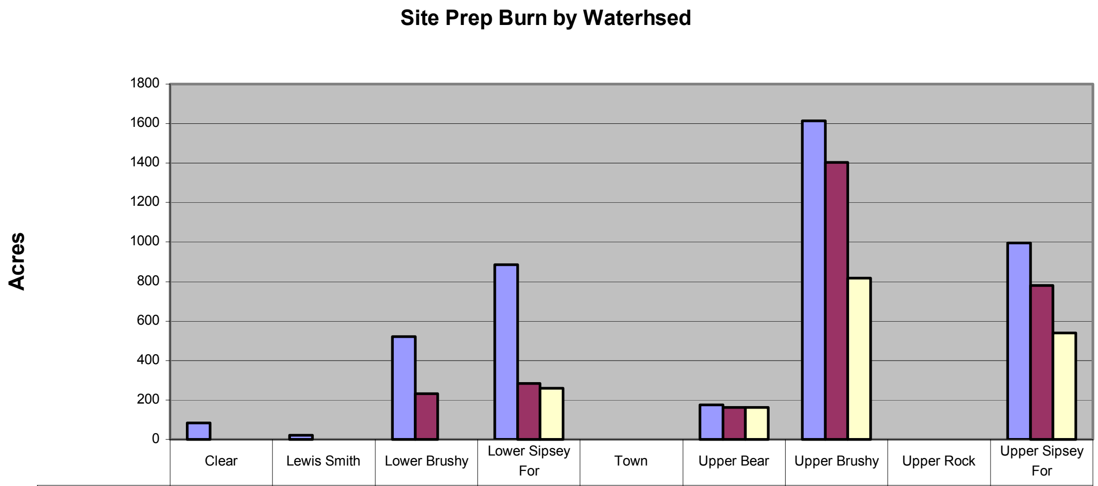


Chart 3.3.3.H - Anticipated Prescribed Burn Acres

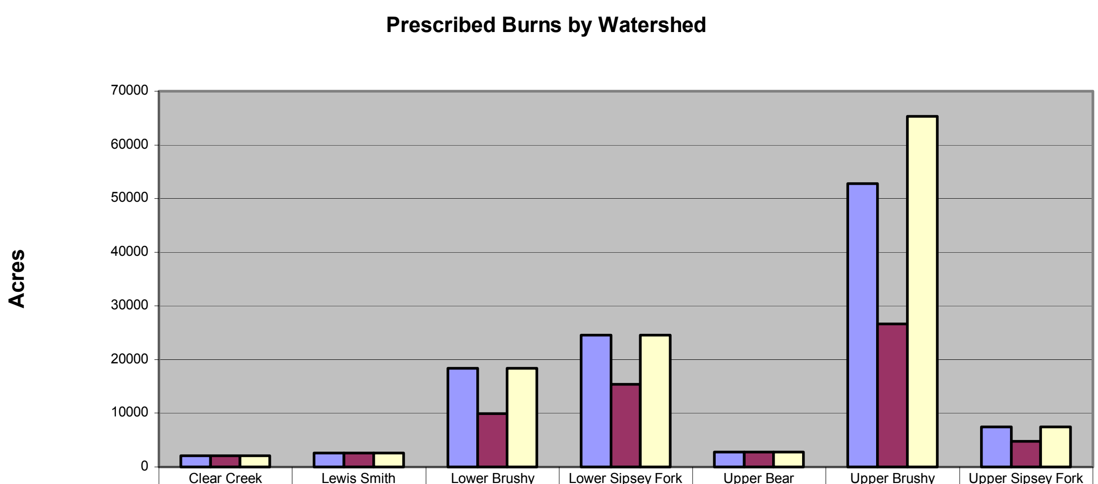
A comparison of burns by watershed reveals that site preparation burns are proposed in seven watersheds under Alternative 2. Site preparation burns are proposed in only five watersheds under Alternatives 3, 5, and 6. Four watersheds have site preparation burns under Alternative 4. Upper Brushy and Upper Sipsey Fork show the highest potential for impacts from site preparation burns. Prescribed burns are anticipated at varying intervals in seven watersheds. Upper Brushy shows the highest potential for impacts from anticipated prescribed burns. (See Charts 3.3.3.I & 3.3.3.J)



	Clear	Lewis Smith	Lower Brushy	Lower Sipsey For	Town	Upper Bear	Upper Brushy	Upper Rock	Upper Sipsey For
Alternative 2	84	21	522	886	0	176	1613	0	996
Alternatives 3,5,6	0	0	231	284	0	161	1404	0	779
Alternative 4	0	0	0	259	0	161	817	0	540

Alternatives

Chart 3.3.3.I - Proposed Site Preparation Burns by Watershed



	Clear Creek	Lewis Smith	Lower Brushy	Lower Sipsey Fork	Upper Bear	Upper Brushy	Upper Sipsey Fork
Alternatives 3,6	2091	2605	18365	24584	2738	52776	7487
Alternative 4	2091	2605	9968	15434	2738	26624	4817
Alternative 5	2091	2605	18365	24584	2738	65343	7487

Watershed

Chart 3.3.3.J - Anticipated Prescribed Burns by Watershed

The use of ***hand tools*** for site preparation is also proposed on some acres. The use of hand tools to add in the release of desirable species would have no potential for impacting water quality and will not be examined in any great detail other than to point out that in some cases hand tool site preparation would take the place of more disturbing site prep activities such as site prep burns and drum chopping. (See Charts 3.3.3.K & 3.3.3.L)

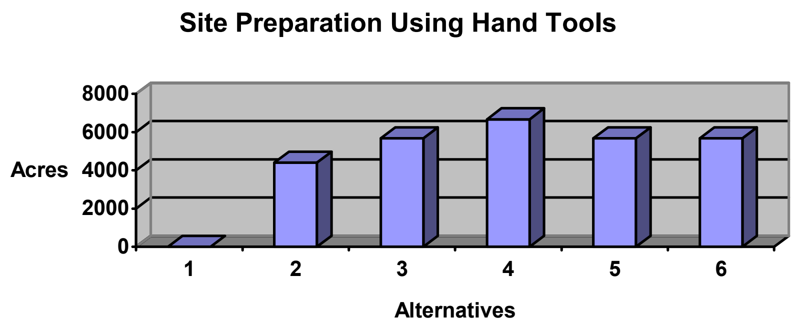
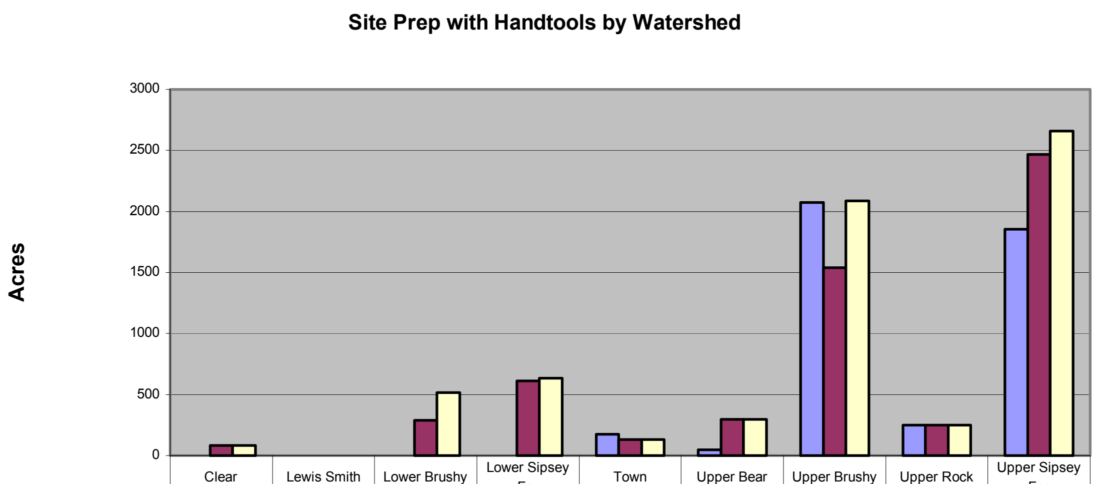


Chart 3.3.3.K - Proposed Site Preparation Acres Using Handtools



	Clear	Lewis Smith	Lower Brushy	Lower Sipsey For	Town	Upper Bear	Upper Brushy	Upper Rock	Upper Sipsey For
Alternative 2	0	0	0	0	173	48	2075	251	1856
Alternatives 3,5,6	84	1	287	611	131	299	1539	251	2466
Alternative 4	84	1	518	636	131	299	2085	251	2660

Chart 3.3.3.L - Proposed Site Preparation Using Handtools by Watershed

Hand or mechanical planting of young trees has no direct effect upon the water resource. Indirect effects (after a period of years) are potential decreases in water yield and changes in the composition of streamside forest communities. Alternative 2 shows the highest potential for indirect effects. Alternatives 3, 5, and 6 show equal potentiality for indirect impacts. Alternative 4 shows the lowest potential for indirect impacts. Plantings would occur in six watersheds under Alternative 2 and four watersheds under Alternatives 3, 5, and 6, Alternative 4 would have plantings in only one watershed. The majority of the plantings would occur in the Lower Brushy, Lower Sipsey Fork, Upper Brushy and the Upper Sipsey Fork watersheds. (See Charts 3.3.3.M & 3.3.3.N)

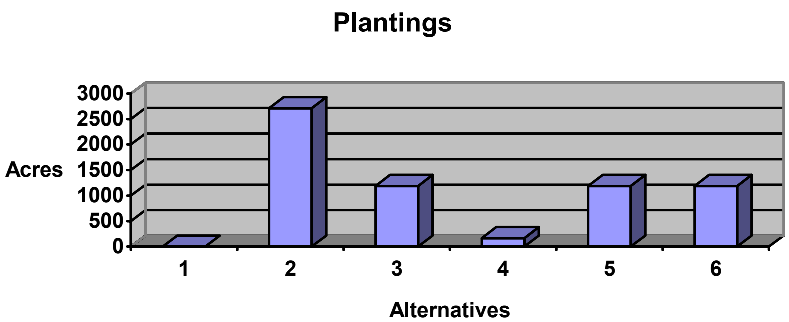
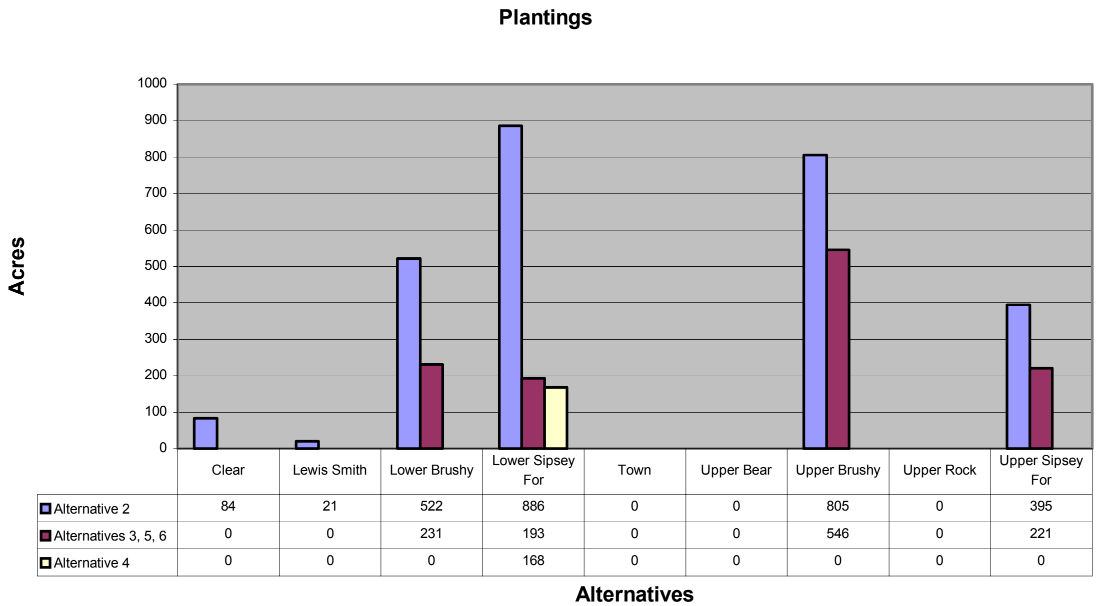


Chart 3.3.3.M - Proposed Acres of Planting



	Clear	Lewis Smith	Lower Brushy	Lower Sipsey For	Town	Upper Bear	Upper Brushy	Upper Rock	Upper Sipsey For
Alternative 2	84	21	522	886	0	0	805	0	395
Alternatives 3, 5, 6	0	0	231	193	0	0	546	0	221
Alternative 4	0	0	0	168	0	0	0	0	0

Chart 3.3.3.N - Proposed Acres of Planting by Watershed

Alternative 1

Alternative 1 the No Action Alternative has no new proposed actions. The current prescribed burns will continue at a rate of approximately 10,000 acres per year. The current influences of the Southern Pine Beatle can be expected to continue to some degree.

Alternative 2

The proposed action calls for 18,143 acres of thinning and 150.9 miles of temporary roads associated with these thins. Proposed restoration activities would occur on 7,382 acres. Site preparation, associated with restoration is proposed as follows:

- drum chopping on 2,713 acres.
- site preparation burning on 4,298 acres
- hand tools on 4,403 acres

Prescribed burns are anticipated on approximately 11,000 acres per year (including site preparation burns). The proposed activity of primary concern is the amount of temporary roads. These roads should have minimal impacts if mitigation measures are followed. Also of concern is the inclusion of Crowdabout and West Flint watersheds within the proposed actions. These watersheds have streams that are listed as impaired by ADEM due to siltation, although the causes are listed as other than silvicultural activities it would be best to limit our activities in these watersheds.

Alternative 3

This alternative calls for 9,452 acres of thinning and 82.1 miles of temporary roads associated with these thins. Proposed restoration activities would occur on 6860 acres. Site preparation, associated with restoration is proposed as follows:

- drum chopping on 1,191 acres
- site preparation burning on 2,859 acres
- hand tools on 5,669 acres

Prescribed burns are anticipated on approximately 11,000 acres per year (including site preparation burns). The proposed activity of primary concern is the amount of temporary roads. These roads should have minimal impacts if mitigation measures are followed. Crowdabout and West Flint watersheds have no proposed actions under this alternative.

Alternative 4

This alternative calls for 8,627 acres of thinning and 74.1 miles of temporary roads associated with these thins. Proposed restoration activities would occur on 6860 acres. Site preparation, associated with restoration is proposed as follows:

- drum chopping on 168 acres
- site preparation burning on 1,777 acres
- hand tools on 6,692 acres

Prescribed burns are anticipated on approximately 6,400 acres per year (including site preparation burns). The proposed activity of primary concern is the amount of temporary roads. These roads should have minimal impacts if mitigation measures are followed. Crowdabout and West Flint watersheds have no proposed actions under this alternative.

Alternative 5

This alternative calls for 9,452 acres of thinning and 82.1 miles of temporary roads associated with these thins. Proposed restoration activities would occur on 6860 acres. Site preparation, associated with restoration is proposed as follows:

- drum chopping on 1,191 acres
- site preparation burning on 2,859 acres
- hand tools on 5,669 acres

Prescribed burns are anticipated on approximately 12,000 acres per year (including site preparation burns). The proposed activity of primary concern is the amount of temporary roads. These roads should have minimal impacts if mitigation measures are followed. Crowdabout and West Flint watersheds have no proposed actions under this alternative.

Alternative 6

This alternative calls for 9,452 acres of thinning and 82.1 miles of temporary roads associated with these thins. Proposed restoration activities would occur on 6860 acres. Site preparation, associated with restoration is proposed as follows:

- drum chopping on 1,191 acres
- site preparation burning on 2,859 acres
- hand tools on 5,669 acres

Prescribed burns are anticipated on approximately 11,000 acres per year (including site preparation burns). The proposed activity of primary concern is the amount of temporary roads. These roads should have minimal impacts if mitigation measures are followed. Crowdabout and West Flint watersheds have no proposed actions under this alternative.

3.3.4 Cumulative Effects (Water)

Cumulative watershed effects are caused by changes that accumulate in time and/or space. Unlike the impact of a single influence, which can be assessed, cumulative watershed effects are caused by the incremental results of multiple influences. In this analysis, cumulative watershed effects are represented by sediment. Sediment is an appropriate measure to determine the effects of management activities on water quality and its associated beneficial uses on forested lands (Coats and Miller, 1981). Sediment increases can adversely affect fish productivity and diversity (Alexander and Hansen, 1986), degrade drinking water and affect recreational values. There may be other cumulative impacts such as increases in water yield as a result of harvesting methods. However, water yield models do not characterize the impacts of all management activities such as road construction and the increase in water yield is generally less than the natural variability. Changes in water nutrients or nutrient fluxes within streams as a result of management activities are minor. The model used predicted sediment yields as the surrogate for determining cumulative impacts for water quality.

Bounding the Effects Analysis

A valid cumulative effects analysis must be bounded in space and time. For the purposes of this project, 5th level watersheds are the appropriate spatial bounds for cumulative effects. The time period for this analysis will be 2003 through 2012. The management activities are set to begin in 2004 and extend until 2008. All watersheds would be fully recovered by 2009. The extension until 2012 is to demonstrate the effects of prescribed fire without other management activities.

Modeling Sediment Yield

Using the National Land use Classification Data (NLCD), a determination of land uses were made for 30-meter grids. These values were tabulated for each watershed including non-Forest

Service lands. Results were used to identify estimated erosion values for entire watersheds. The sediment model used was designed by Alan Clingenpeel.

The erosion for roads was determined using the RAP roads layer to determine miles by surface type per watershed. ATV trails and erosion from prescribed burns were also used. Erosion from timber harvested periodically on private forested lands was also considered. Southern Pine Beatle spots were used for their contribution to erosion. Coefficients for erosion and recovery rates were taken from the averages developed specifically for the Bankhead National Forest in the Soil Erosion Calculation Process Record for the 1986 Land and Resource Management Plan.

Erosion values (from land use) were multiplied by a sediment delivery coefficient based on watershed size determined from Rhoel (1964). This model sums the total number of sediment tons from roads and calculates sediment from erosion delivered to the mouth of the watershed.

All values were summarized in a spreadsheet by watershed for the baseline sediment yield and current sediment yield (Forest Service and private). The acres of proposed activities are placed in the sediment spreadsheet for each alternative and year.

Data Interpretation

The summary worksheet of the sediment model calculates the baseline, current, and predicted sediment values for each watershed by alternative and year. To determine the potential cumulative effects of water quality and associated beneficial uses these sediment values are expressed as a percent increase over the baseline. The baseline assumes an undisturbed forest floor with no roads. It should be recognized that using such a baseline will result in high percentage increases since baseline values can indicate little to no erosion or sediment. The percentage values are only used as a mathematical index and should not be viewed as an indication of effects or impairment. This becomes more clear when the interpretation of this information is captured in a value added process call the Watershed Condition Rank (WCR) as described below.

Watershed Condition Rank

Watershed Condition Rank (WCR) is a measure that characterizes the condition of 5th level watersheds with respect to current and future sediment load increases.

In order to establish WCRs, the current sediment average annual yield is determined and expressed as a percent above the baseline conditions. This provides a relative measure to determine changes within watersheds. The next step in this process is determined by using the relative abundance of locally adapted species with respect to predicted sediment increases to create a species-sediment load relationship or index (SSI). This score is modified by a weighted average where the watershed occurs in more than one physiographic zone. Watershed condition is generalized into three categories of excellent, average and below average. The SSI, however, does not necessarily translate into an excellent or poor watershed but broadly categorizes the watersheds based on the sediment prediction/aquatic viability relationship. The SSI is a relatively large-scale coarse filter developed to evaluate alternatives in Forest Plans and to establish priority work at the planning scale. Therefore, further detailed analyses of the watershed will be conducted at the project level.

From the WCR a series of determinations can be made that determine or assign additional Forest Objectives. The following section details the outcome of the WCR with respect to adverse effects on aquatic biota as they are related to forest management:

- Where a watershed SSI is ***excellent***, the probability (or potential) is **low** for adverse effects to aquatic species. If the results of project alternatives remain within this range there should be no adverse effect on water quality with respect to beneficial uses (fish communities). Forest Service objectives would be to maintain or improve aquatic health through the implementation of riparian prescriptions.

- Where a watershed SSI is ***average,*** the potential to adversely affect beneficial uses is **moderate**. Additional forest objectives should be considered. Examples of these additional objectives would be conducting watershed assessments during project planning to identify the source of the problem, and monitoring prior to project implementation to determine actual health of the biota.
- Where a watershed with a SSI is ***below average***, the potential to adversely affect beneficial uses is **high**. In addition to objectives listed above, Forest objectives at the project level would seek to maintain or restore watershed health and aquatic systems where the Forest Service can make meaningful contributions to watershed health. Apply prescriptions in the revised forest plan to correct the unhealthy situation.

The results of the WCR and other information can also be used to develop partnerships with other landholders or managers to improve overall watershed condition and improve aquatic health. This is one advantage of analyzing entire watersheds. Not only can Forest Service activities and contributing effects be isolated but other watershed effects can be identified as well.

Assumptions, uncertainties and limitations

Many assumptions are made throughout the sediment model and the WCR. Every effort has been made to describe those assumptions and minimize misrepresentation. With that in mind the application of the sediment model and associated WCR should not be taken as absolutes but as a method that can describe the effects from the range of alternatives and suggest where a greater risk with respect to water quality and aquatic biota exists. This process is developed for the forest plan level.

Watershed condition is an accumulation of disturbance across the entire watershed and is expressed at the outfall of that watershed. Subwatersheds within a 5th level watershed will have a range of watershed conditions. The conditions of subwatersheds and the determination of effects will occur at the project level.

Results of Analysis

Using the SSI, four watersheds ranked Excellent and the remaining seven were not applicable due to the low percentage of National Forest Ownership. If the low percentage of National Forest Ownership is not applied, these seven watersheds received an Excellent ranking according to SSI. Therefore, there are no significant potential impacts to the watersheds in the analysis area by any alternative. However, it is necessary to rank the watersheds based on there potential impacts. The ranking will be done using an average percent increase over baseline by alternative. Alternatives 1 and 2 show the highest potential for impacts. Alternative 1 is high because of the current and potential Southern Pine Beatle sites and the erosion related with them. Alternative 2 is high because of the amount of acres on which there is proposed activities. Alternatives 3, 5, and 6 have relatively the same values. Alternative 3 is the lowest due to the low amount of acres on which there is a proposed action. (See Chart 3.3.4.A)

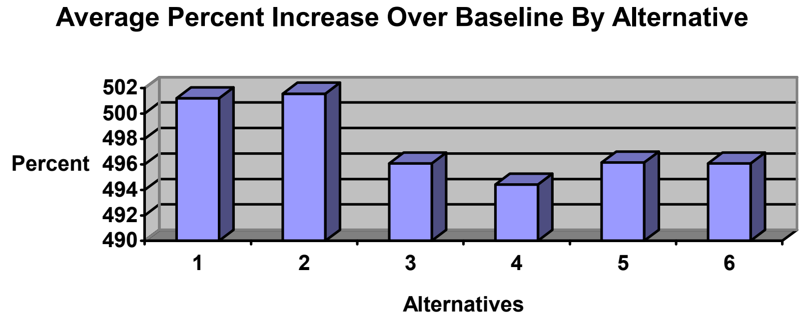
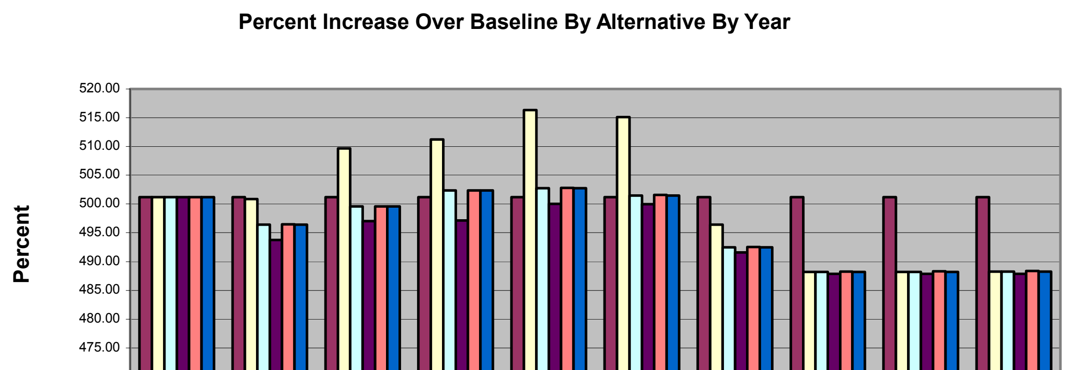


Chart 3.3.4.A - Potential Impact to Water Over Baseline

Another consideration in the cumulative effects analysis is the temporal or time. Proposed activities for the alternatives are set to begin in 2004 extending until 2008 except for prescribed burns. The effects of erosion from these activities would end in 2009. Prescribed burns are anticipated for all alternatives except Alternative 2. These prescribed burns are depicted through the duration of the analysis timeline or until 2012. Two things are apparent when reviewing the temporal section of the cumulative effects analysis.

- Alternative 2 has a period of four years (2005 – 2008) where the average percent increase over baseline peaks well over the other alternatives.
- After 2009 the percent increase over baseline for all alternatives fall below the percent increase over baseline for Alternative 1.

This means that the proposed activities under Alternatives 2, 3, 4, 5, and 6 would serve to improve the condition of the watersheds better than Alternative 1. (See Chart 3.3.4.B)

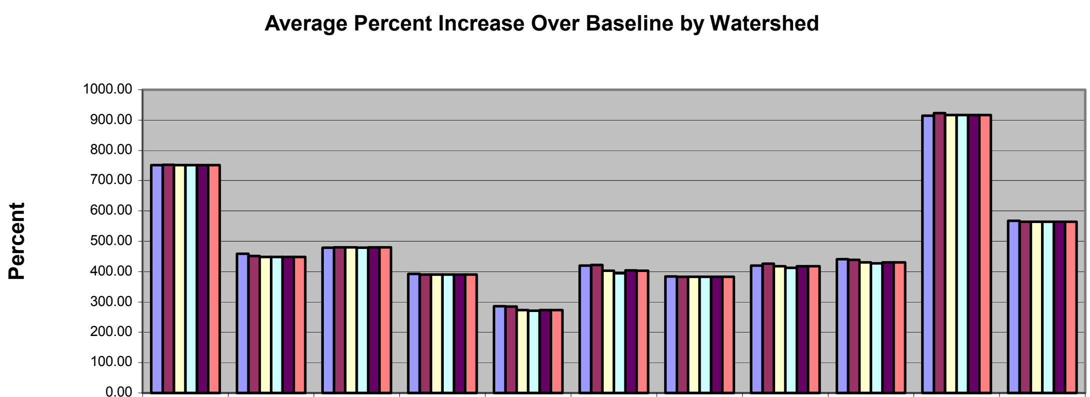


	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Alternative 1	501.19	501.19	501.19	501.19	501.19	501.19	501.19	501.19	501.19	501.19
Alternative 2	501.19	500.84	509.70	511.24	516.36	515.09	496.41	488.19	488.22	488.23
Alternative 3	501.19	496.42	499.56	502.34	502.73	501.48	492.47	488.19	488.22	488.23
Alternative 4	501.19	493.75	497.00	497.11	500.05	499.94	491.57	487.85	487.87	487.89
Alternative 5	501.19	496.46	499.59	502.37	502.79	501.55	492.55	488.28	488.33	488.35
Alternative 6	501.19	496.42	499.56	502.34	502.73	501.48	492.47	488.19	488.22	488.23

Year

Chart 3.3.4.B - Potential Impact to Water Over Baseline by Year

The final consideration in the cumulative effects analysis is the spatial element. The spatial bounds for the analysis were the 5th level watersheds that have proposed activities within them. This spatial element considers the potential effects by watershed by alternative using the average percent increase over baseline for the analysis period. Examination of this analysis reveals that there is little difference in the between the potential impacts by any alternative. Small differences can be seen between the alternatives. These differences are mainly that Alternatives 1 and 2 show higher potentials for erosion than do the other alternatives. This analysis also demonstrates the variability of the SSI percent increase over baseline between watersheds. That is to say that all of the watersheds have different baselines. (See Chart 3.3.4.C)



	Town Creek	West Flint	Upper Bear	Crowdabout	Upper Sipsey Fork	Upper Brushy	Upper Rock	Lower Brushy	Lower Sipsey Fork	Clear Creek	Lewis Smith
Alternative 1	750.96	458.59	479.11	392.08	285.49	420.35	383.49	419.79	441.07	914.93	567.20
Alternative 2	751.67	451.62	480.40	390.74	284.43	422.29	382.66	426.54	438.34	923.45	564.87
Alternative 3	751.06	448.45	479.60	390.62	273.36	403.08	382.39	417.78	429.92	916.77	563.88
Alternative 4	751.06	448.45	479.34	390.62	270.76	394.88	382.39	412.82	427.67	916.77	563.88
Alternative 5	751.06	448.45	479.60	390.62	273.23	403.70	382.39	417.78	430.13	916.77	563.88
Alternative 6	751.06	448.45	479.60	390.62	273.36	403.08	382.39	417.78	429.92	916.77	563.88

Watershed

Chart 3.3.4.C - Potential Impact to Water Over Baseline by Watershed

Conclusions

Based on the finding of the cumulative effects analysis and the SSI, all watersheds within the analysis area are in excellent condition and will remain as such no matter which alternative is selected. However, Alternative 2 should be given thoughtful consideration before being selected. Based on the SSI percent increase over baseline Alternative 2 ranks significantly higher than does the other alternatives except Alternative 1. Also Alternative 2 has proposed Activities in two watersheds (Crowdabout and West Flint) that contain streams that are designated as impaired due to siltation by Alabama Department of Environmental Management, although the causes are listed as other than silvicultural activities it would be best to limit our activities in these watersheds. The temporal portion of the effects analysis supports the selection of any alternative rather than Alternative 1. Over the cycle of the analysis period it was shown that watershed conditions would be improved by the selection of any alternative other than Alternative 1, due to the potential impacts of the Southern Pine Beatle. Considering the potential impacts of Alternatives 1 and 2, Alternatives 3, 4, 5, and 6 show the least potential for impacts to the analysis area watersheds.

3.3.5 Monitoring

Temporary roads associated with thinning are known to potentially affect water quality, water quantity, channel morphology, and downstream-designated uses. Ten percent of the total miles of temporary roads should be monitored to insure that mitigation measures are implemented and are effective. Should problems emerge a larger sample should be monitored and additional mitigation measures taken.

This project will be included in the Soil and Water Standard and Guidelines Monitoring Plan, developed by the Forest Hydrologist, to monitor the compliance and effectiveness of Standards and Guidelines.

3.4 Aquatic Species

3.4.1 Issues

Bankhead National Forest is known for its clear streams that arise in the wooded hills of the Black Warrior River basin. Found within those streams are a diverse aquatic biota, featuring several species of fish and mussels present in few other locations. During the scoping process several issues concerning these aquatic systems were raised, they are as follows:

- Impacts of the proposed treatments on federally listed species of plants and wildlife, which are defined by the Endangered Species Act of 1973 as amended, Forest Service Regional Forester's Sensitive Species list, and upon locally rare species.
- Impacts of the proposed treatments to soil and water resources.

This section will address concerns for those species of aquatic wildlife that could be impacted by management activities proposed in each alternative. The focus of this EIS is the management of upland forests and woodlands. Impacts to this resource could be by direct interaction and indirect processes such as sedimentation of streams (from soil erosion), that may be caused by the proposed treatments. Non-point source pollution due to soil erosion and sedimentation is a potential result of management practices employed in some alternatives considered. Practices that result in a soil disturbance are considered within this chapter.

3.4.2 Affected Environment

Present Condition of Aquatic Resources and Habitats

Bankhead National Forest is located partially within the Tennessee River Basin and primarily within the headwaters of the Black Warrior Drainage. The Tennessee River Basin is ranked as the most diverse freshwater fish fauna in North America (Abell et al. 2000). Although the Forest only includes small headwater portions of Tennessee River tributaries, inclusion of some endemic Tennessee River Basin species contributes to overall diversity. The Black Warrior watershed is a tributary to the Alabama River system, and is a part of the larger Mobile River Basin. The Mobile Basin supports the second richest freshwater fish fauna in North America (USFWS 2002) and historically was the world leader in freshwater mollusk diversity (Abell et al. 2000). Few areas of the Black Warrior River Basin have large blocks of undeveloped forestland as are found within this headwaters location. Being in this geographical position, the streams of the Bankhead National Forest are habitat for a large variety of plants, fish, reptiles, amphibians, mussels and other aquatic invertebrates, including many species that are endemic to the area. There are no less than 42 threatened, endangered, sensitive and locally rare aquatic and riparian species of concern. These can be found in a variety of diverse landforms that include ephemeral and perennial streams, bottom lands amongst canyon corridors and within the recesses of limestone caves and rock shelters. Because of its scenic and educational value as well as its unique biological resources, Congress designated 61 miles of Sipsey Fork of the Black Warrior River in 1988 as a Wild and Scenic River.

The Black Warrior River Basin drains approximately 95% of the Bankhead National Forest. This area includes Upper Sipsey Fork, Upper Brushy Fork, Upper Rock Creek, Lower Sipsey Fork, Lower Brushy Fork and Clear Creek watersheds. The remaining 5% of the Bankhead is drained by small tributaries of the Tennessee River system (Dycus 1972). These include Upper Bear Creek, Town Creek, West Flint Creek and Crowdabout Creek.

Runoff waters of forested watersheds provide the basic resources for aquatic habitats within the Bankhead. Land cover/land use, geology, topography and land management practices that occur within the watershed affect the physical, chemical and biological factors that constitute aquatic habitat. To some degree, the actions that take place within the watershed, including those on private land, affect the quality of aquatic wildlife and plant habitats (National Academy of Science 1970). Biologists have long recognized that aquatic organisms are excellent indicators of water quality. Many species require precise habitats and water quality conditions, such that their presence, abundance and continued existence, is directly related to water quality. Many species are clear indicators of the overall health of the streams in which they are found (Mettee et al. 1996).

Aquatic habitats within Bankhead National Forest can be grouped into four areas:

- Those of flowing, above ground streams,
- Those found in underground streams within caves,
- Those found in large open water reservoir habitats, and
- Those found in wetlands.

Stream Habitats

Many sources have cited the unique and high quality streams within the Bankhead National Forest. Surveys conducted or contracted by the Forest Service and other resource agencies indicate that the streams of the Bankhead National Forest contain a diverse aquatic ecosystem (Davis 2003; Bailey 1989; Boschung and Mettee 1974). This diversity includes 14 species listed as threatened or endangered with two more that are potential candidates.

The U.S. Fish and Wildlife Service has proposed critical habitat for certain species of mussels within Bankhead National Forest. Critical habitat is defined as a specific geographic area that is essential for the conservation of a threatened or endangered species that may require special management and protection. Mussels that are being considered for critical habitat designations within the Bankhead National Forest include:

- Alabama moccasinshell
- orange nacre mucket mussel
- dark pigtoe
- ovate clubshell
- triangular kidneyshell

Proposed critical habitats within Bankhead National Forest are not considered as imperiled, rather as those of integrity and quality and are critical to the conservation of these species. Haag and Warren (1997) noted that the streams of Bankhead National Forest harbor diverse, remnant examples of the Mobile Basin upland mussel fauna.

The Alabama Department of Environmental Management periodically conducts monitoring activities in streams of the Bankhead National Forest. They utilize a standardized approach, known as an Index of Biotic Integrity (IBI). The approach results in a rating that is an index to overall biological health of the stream. The streams sampled in 2002 within Bankhead rated from fair to fair/poor condition and are listed in Table 3.4.2.A (Davis 2003). These ratings reflect impacts from the past to the streams and their endemic fish populations within Bankhead National Forest. The current explanation for the stream conditions is that the region was in extreme drought conditions during 2000 and 2001. Many streams dried up to just a few stagnant pools and the aquatic inhabitants suffered. This may not have been ample time for the fish and invertebrate populations to sufficiently recover. These effects were in no doubt compounded by the fragmentation of contiguous aquatic habitat by the construction of reservoirs within the Black Warrior waterways.

Sample Site Watershed	**Sipsey Fork** Lower Sipsey	**Brushy Creek** Lower Brushy	**Inman Creek** Upper Brushy	**Thompson Cr.** Upper Sipsey
ADEM IBI Rating	**Fair**	**Fair-Poor**	**Fair – Poor**	**Fair**

Table 3.4.2.A - 2002 Index of Biotic Integrity (IBI) Ratings, (Davis 2003)

Watershed conditions were also addressed in the Draft Environmental Impact Statement (DEIS) for the Revised Land and Resource Management Plan, National Forests in Alabama (USFS 2003). The "Species Sediment Load Relationship or Index (SSI) is a summary of landscape scale conditions that may indicate the hydrologic, morphologic, and water quality conditions of 5th level watersheds with respect to current and future sediment load increases. If a watershed has an *Excellent* SSI the potential for adverse effects to aquatic species (based on sediment load modeling) is relatively low (USFS 2003). According to the DEIS, Lower Flint and Town Creek watersheds are the only two watersheds within the Bankhead that do not have an *Excellent* SSI (USFS 2003).

Although many streams found within the Bankhead National Forest exhibit diverse, abundant and viable populations of aquatic biota, they are not without historical and/or ongoing impacts. Their setting within the mountainous, relatively isolated headwater position in the landscape has perhaps buffered them from some of the impacts that other streams across the state have endured (McGregor 1992). From a historical context, high impact logging at one time was the norm for homesteaders and sustenance farmers, this contributed to periods of intense erosion and sedimentation within geographical context of what is now Bankhead National Forest (Rickman and Luvall, 1996).

In general, areas of concern for aquatic species include habitat fragmentation, alteration of flow, water chemistry, habitat structure, and/or temperature, significant increases of algae growth (nutrients), alteration of channel morphology, and introduction of non-native species. Within the scope of this project, management activities defined by the alternatives will not contribute to habitat fragmentation, flow, structure, or temperature. Management activities that would impact aquatic habitat include those that increase sediment deposition within the stream channel to such degree that appreciably reduces the value of habitat above and beyond natural occurrences. This includes silviculture practices of thinning, restoration site preparation, and temporary road construction. Some streams are unsurprisingly prone to higher sediment loading rates. The aquatic species found within those streams are naturally more tolerant of fine sediments. But, the majority of aquatic species found within streams of the Bankhead are sensitive to sedimentation.

Caves

There are numerous caves found within the area, these are typically restricted to the northern ½ of the Bankhead National Forest expanse. Caves result from the dissolution of limestone substrate by slightly acidic water types, producing what is commonly referred to as a karst landscape. This landform presents unique habitat opportunities, which may accommodate similarly unique organisms. A variety of aquatic and semi-aquatic animals are known to inhabit the few caves that have been surveyed. Taxa such as fish, salamanders, crayfish and other invertebrates could inhabit Bankhead caves. At this time, no aquatic species have been discovered that are identified as threatened, endangered, or sensitive species. The State of Alabama is known to have one of the richest collections of underground fauna in the world, increasing the possibility that such life exists but yet to be discovered under the Bankhead National Forest. In addition, given the lack of comprehensive surveys, there is a very high likelihood of new species not yet described to inhabit Bankhead caves. The Forest Service has direction for managing and protecting cave resources (USFS, 2003). Current practice is to manage these resources as if they were significant until extensive biological investigations are conducted and reveal a more limited extent of cave inhabitants. There are no known caves located within areas proposed for treatment. Any caves discovered within or adjacent to treatment areas will be identified and protected.

Caves are classified as 'inactive' if they show no signs of current development. Such signs would include the presence of water, indicating the cave is actively enlarging. Caves that demonstrate features indicating current development are classified as 'active'. Active caves can be further classified as "influent", "effluent" or "through" caves determined by the relationship they have with flowing water sources. The cave types most vulnerable to forest management practices are influent caves because the streams flow into the cave. Inflowing streams that contain too large a sediment load or nutrient concentration can be detrimental to aquatic cave inhabitants. Effluent cave types are predominantly fed by ground water sources of high quality and through caves allow contaminants to be flushed from the environment. Influent caves are therefore the most vulnerable to increased sedimentation and other water quality changes that result from land use and climatic variables.

Reservoir Habitat

The upper Black Warrior River Basin tributaries (Sipsey, Brushy, Rock, and Clear Creeks) flow into Lewis Smith Lake Reservoir. Approximately 40 miles of this man-made reservoir's 500 miles of shoreline fall within the Bankhead National Forest. Smith Lake is approximately 21,200 acres in size at the normal pool elevation of 510 feet above mean sea level. The lake is operated by Alabama Power Company for hydroelectric generation, flood control, navigation flow augmentation, storage for power generation, maintenance of downstream water quality, industrial and municipal water supply, recreational opportunities, and habitat for some species of fish and wildlife. Upon the reservoir's fluctuation, portions of the tributaries are inundated and temporarily become slackwater. The numerous sloughs and coves along the lake provide shallow water habitats for a variety of aquatic species. The lake is well known for its sport-fishing opportunities (Kleinschmidt Associates and Alabama Power Company 2000).

Wetlands

Wetlands within Bankhead National Forest are classified as lacustrine, riverine, or isolated upland types.

Lacustrine wetlands include those areas of emergent or submergent plant growth along reservoir, lake, and pond margins. The numerous sloughs and coves along the Lewis Smith Lake provide productive shallow water habitats for a variety of aquatic, riparian, and terrestrial species.

Riverine wetlands are typically found in direct association with riparian areas along stream margins or sand and gravel bars. There are also those wetlands induced by beaver activity along small streams and their tributaries. These areas are characterized by flooding for a number of days within the winter and during the growing season. Such natural impoundments create ponded open water and palustrine wetland habitats similar, but on a lesser scale than human built reservoirs.

Isolated or depressional wetlands are usually isolated from larger contiguous riverine and palustrine wetlands and are less than 1 acre in size. They are found within upland areas and are similar in appearance to a sinkhole. They are apparently the product of the karst topography of the region. Locally known as "gum ponds" or "bogs," these areas are characterized by the presence of hydric soils and a predominance of hydrophytic plants. These wetlands vary in size and depth seasonally depending upon topography, climate and precipitation. During this cycle of wet and dry, they provide habitat for a variety of plant and animal species. The moist soils around these sites provide habitat for several species of sensitive plants including the yellow lady's slipper and the white-fringeless orchid. Various species of sedges, sphagnum moss, the cranefly orchid, wild azalea, willow oaks, water oaks and black gum are commonly found along the wetland margins. Upland water sources such as these are an important source of water and foraging sites for bats. They also serve as breeding sites for amphibians and reptiles. At the current time, there is no database of the wetlands on the Bankhead National Forest. Ongoing surveys will identify and document their presence until a database can be established. Areas proposed for treatment through this project have been surveyed and no isolated wetlands were detected.

Past Actions that Have Affected the Present Condition of Aquatic Environments

The current forest shows little evidence that the lands and streams of what is now the Bankhead National Forest have been unquestionably impacted by human influence. Prior to the establishment of the Bankhead, the land was harvested for timber, crops were planted, livestock roamed freely, roads were constructed, grist mills were constructed in stream corridors, and fire was a commonly utilized tool by man (McDougal et al. 2001).

Although the effects of forest management activities on the lands of the Bankhead National Forest are the focus of this evaluation, the impacts to aquatic habitats from activities on adjoining, private lands cannot be ignored when addressing overall ecosystem health and the cumulative effects of all management activities. There are numerous in-holdings of private property interspersed throughout the Bankhead. While there is currently a decline in row crop and livestock agriculture within Winston County, the late 1970's saw an increase of row crop agriculture (Robinson). There were no regulations at the time regarding soil conservation and erosion was severe.

In the late 1990's, new Best Management Practices (BMP's) were instituted by the Alabama Department of Environmental Management to regulate the application of animal waste to the landscape. Prior to this legislation, nothing governed the land application of animal wastes from poultry or other livestock operations. The Alabama Agricultural Statistics Service maintains records that also indicate a downward trend in the production of cattle (18% decline) and poultry (10% decline) within Winston County in the recent years (Valkenberry 2003).

Alabama BMP's for forestry have been in place since 1992 to help protect and maintain the biotic integrity of the state's waterways. Prior to this, there were no regulations addressing water quality protection relative to forestry practices. However, these BMP's are not mandatory for private and corporate landowners within the state of Alabama.

Coal mining has occurred on lands surrounding Bankhead National Forest for many years. Prior to the creation of the Surface Mining Control and Reclamation Act of 1977 there were no regulations regarding the reclamation of areas mined for coal or other minerals. Regulated mining operations adjoining Forest Service lands negatively affected aquatic habitats. In 1993, three settling ponds servicing an active strip mine breached, allowing mine runoff to impact Seymour Branch, a tributary to Clear Creek, on Forest Service lands. Following this event, Forest Service personnel documented a lack of biological activity within Seymour Branch. Iron precipitate is currently present within the stream, a result of the upstream surface mining incident. There is a current NPDES Permit for discharging treated drainage from the Hickory Grove surface coalmine to Seymour Branch and an unnamed tributary.

Residential development is expanding at a rapid pace in many areas of the Bankhead. The aura of living within the forest and/or adjacent to Lewis Smith Lake is an attraction for individuals and real estate developers alike.

Development can increase nutrients entering aquatic ecosystems while the associated land clearing and road construction result in increased runoff and increased sedimentation. Poor design, installation and maintenance of septic tanks can have localized impacts when development occurs directly on the bank of lakes and streams (North Carolina Commission for Health Services 2000). Ornamental landscaping results in increased fertilizer and pesticide use adding to excessive nutrient loading.

Permanent roads are essential to the National Forest and private lands. Public and forest roads through Bankhead are either paved or unimproved. Unimproved roads have been identified as a primary source of sediment and provide a continuing potential for soil erosion. (Van Lear et al. 1995). Where these roads are near streams, the soil readily washes into the aquatic habitat (U.S. Forest Service 1996). Vehicles often create drainage problems when using roads during periods of excessive rainfall. Additionally, culverts can concentrate soil material on the discharge side of the road.

Habitat modification and fragmentation are currently the most pressing problems confronting aquatic species within the Bankhead National Forest. Management actions associated with this project will not further modify or fragment aquatic habitat.

Aquatic Species of Concern

Species which are either federally listed as threatened, endangered, identified by the Forest Service as regionally sensitive, or considered locally rare by state natural heritage organizations are identified in Table 3.4.2.B. The aquatic habitats of these species were analyzed for potential impacts resulting from this project. A more detailed discussion of these species, their habitat requirements, and effect analysis can be found in the Biological Assessment and Evaluation completed as a part of this project and contained in the Appendix. This section highlights some habitat requirements of aquatic species and their susceptibility to water quality degradation.

Freshwater mussels are filter feeders, making these organisms susceptible to excessive stream sedimentation. Mussels require clean gravel riffles and are especially sensitive to low dissolved oxygen levels or high chlorine concentrations in the environment. Other factors that negatively impact mussel habitat include contamination by pesticides, heavy metals and the introduction of exotic mollusks.

Darters use a variety of stream types and habitats all of which are susceptible to impacts from sedimentation, loss of adequate stream substrate, temperature, structure, water flow and water quality.

The black warrior waterdog and the flattened musk turtle are found in a variety of headwater and higher order streams upstream from the influence of Lewis Smith Lake. Required habitats include a low silt load, minimal deposition, low nutrient and bacterial content, moderate temperatures, and overall high water quality. Changes to these characteristics adversely affect the black warrior waterdog and musk turtle habitats.

Extensive work on reptile and amphibian populations within the Bankhead has not been undertaken. The present knowledge of habitat requirements for most amphibian and reptile species is based upon field observations by specialists (Wilson 1995).

Species	Status	Species	Status
Flattened musk turtle *Sternotherus depressus*	Threatened	Cocoa clubtail *Gomphus hybridus*	Sensitive
Cumberlandian combshell *Epioblasma brevidens*	Endangered h/	A caddisfly *Hydroptila paralatosa*	Sensitive
Upland combshell *Epioblasma metastriata*	Endangered	A caddisfly *Rhyacophila carolae*	Sensitive
Turgid blossom pearly mussel *Epioblasma turgidula*	Endangered h/	Alabama spike *Elliptio arca*	Sensitive
Fine-lined pocketbook *Lampsilis altilis*	Endangered	Southern creekmussel *Strophitus subvexus*	Sensitive
Orange-nacre mucket *Lampsilis perovalis*	Threatened c/	Alabama rainbow *Villosa nebulosa*	Sensitive
Alabama moccasinshell *Medionidus acutissimus*	Threatened c/	A liverwort *Aneura maxima*	Sensitive
Coosa moccasinshell *Medionidus parvulus*	Endangered	A liverwort *Cheilolejeunea evansii*	Sensitive
Dark pigtoe *Pleurobema furvum*	Endangered c/	A liverwort *Pellia X appalachiana*	Sensitive
Ovate clubshell *Pleurobema perovatum*	Endangered c/	A liverwort *Plagiochila echinata*	Sensitive
Rough pigtoe *Pleurobema plenum*	Endangered h/	A liverwort *Radula sullivantii*	Sensitive
Triangular kidneyshell *Ptychobranchus greeni*	Endangered c/	A liverwort *Riccardia jugata*	Sensitive
Pink mucket pearlymussel *Lampsilis orbiculata*	Endangered h/	Alabama Jamesianthus *Jamesianthus alabamensis*	Sensitive
Kral's water-plantain *Sagittaria secundifolia*	Threatened	White fringeless orchid *Platanthera integrilabia*	Sensitive
Black Warrior waterdog *Necturus alabamensis*	Candidate for Federal listing - Sensitive	Bandfin darter *Etheostoma zonistium*	Locally Rare
Warrior darter *Etheostoma bellator*	Sensitive	Flame chub *Hemitremea flammea*	Locally Rare
Tuskaloosa Darter *Etheostoma douglasi*	Sensitive	Delicate spike *Elliptio arctata*	Locally Rare
Rush Darter *Etheostoma phytophyllum*	Sensitive	Alligator Snapping Turtle *Macroclemys temminckii*	Locally Rare
Tuscumbia darter *Etheostoma tuscumbia*	Sensitive	Yellow lady's slippers *Cypripedium pubescens*	Locally Rare
Blueface darter *Etheostoma sp cf. zonistium*	Candidate for Federal listing – Locally Rare	Southern Hickorynut *Obovaria jacksonian*	Sensitive
Longhead darter *Percina sp. cf. macrocephala*	Sensitive	Alabama Hickorynut *Obovaria unicolor*	Sensitive

Table 3.4.2.B - Aquatic Species of Concern-
Federally listed Threatened or Endangered species, Forest Service Sensitive or Locally Rare species of the Bankhead National Forest. c= Proposed for critical habitat designation within the Bankhead National Forest, h=historical habitat range.

Species	Watershed								
	Upper Sipsey	Lower Sipsey	Upper Brushy	Lower Brushy	Clear Creek	Town Creek	Bear Creek	Flint Creek	Lewis Smith
Fish Species (#)	6	0	1	0	1	1	3	1	0
Mussel Species (#)	10	10	10	9	0	3*	1	3*	0
Other Invertebrate Species (#)	1	0	0	0	1	0	0	0	0
Plant Species (#)	7	2	0	0	0	0	0	0	0
Reptile & Amphibian Species (#)	2	2	1	2	1	0	0	0	1

Table 3.4.2.C - Aquatic Species of Concern by Watershed-
All 5th level watersheds with species of concern are shown below listed by the number of species per group. * = Historical habitat; these species are not currently found in these habitats.

3.4.3 Environmental Effects

The management activities within the scope of the alternatives of this EIS will be analyzed for their potential impacts to aquatic species and their habitats. Direct impacts are observable, measurable, and sometimes predictable. An indirect impact could result from an activity that does not contact the stream, but causes changes within the stream.

Management activities indirectly impact aquatic resources through water quality concerns. The primary risk is the potential for soil erosion that results in sedimentation; secondary risks arise from nutrient loading and lowering of dissolved oxygen content. Activities that have the potential for causing soil erosion include thinning, site preparation by drum chopping, prescribed burning, construction of temporary roads and tree establishment by artificial and natural means (regeneration). Reference will be made to the Water Quality Section of this document, which details and describes issues related to sedimentation and water quality. The universal soil loss equation (USLE) was used to estimate sheet and rill erosion rates for proposed thinning, drum chopping and site preparation burning on a variety of local soils and can be reviewed in the project file. Table 3.4.3.A identifies sources of species viability risks for aquatic species of concern.

Thinning

Thinning operations generally are not considered to result in excessive soil erosion as compared to large scale clear-cut harvesting operations; because only a portion of the trees are removed. Furthermore the limbs and slash are typically scattered across the site to cover any soil disturbance (Castro and Reckendorf 1995). Thinning operations require fewer temporary roads, skid trails and loading decks moderately impacting about 10% of the thinned area and last for approximately three years (DRLRMP USFS 2003). Soil erosion results from recent soil surface exposures, which can be minimized (U.S. Forest Service Southern Appalachian Assessment p. 100).

Nutrients may be leached from the soil exposures and indirectly effect aquatic habitats but the limited fertility of soils within the Bankhead will not create a concern for the aquatic resources. In general, thinning practices result in a net loss of nutrients from the landscape.

With proper mitigation measures (refer to mitigation measures in Chapter 2) and Land and Resource Management Plan National Forest in Alabama (LRMP) guidance, thinning minimizes the soil erosion potential resulting in minimal effects to aquatic species or their habitat. Table 3.3.3. B presents the number of acres proposed for thinning within each watershed by each alternative.

There are potential direct effects of tree removal from riparian and streamside zones, these include increases in water temperature, decrease in shade and stream cover, changes to patterns of nutrient cycling, reduction in stream bank stability, and decrease in large woody debris recruitment. However, these are not expected to be incurred because of adherence to state BMP's and other prescription specific protection measures. Additionally, sites proposed for treatment are within the uplands and are not located within streamside management zones.

Site Preparation Drum Chopping

The restoration process included in the alternatives provides for establishment of native community types by conducting site preparation activities accomplished by drum chopping. The use of a drum chopper pulled by a dozer normally has little effect upon the soil resource when conducted under low moisture conditions. The action of the chopper blade creates shallow chopping indentions in the soil surface that traps soil particles and increases water infiltration (DRLRMP, USFS 2003). A significant advantage of the chopper is that it does not displace the topsoil thus, limiting sediment yields (Florida Forestry Information 2003). Direct effects to aquatic resources will be incurred if this activity is conducted within streamside zones or directly adjacent to riparian areas. However, this activity will not be conducted within riparian areas and streamside zones according to direction set forth in the DRLRMP (USFS 2003), and therefore no direct effects on aquatic biota and their habitat are expected as a result of drum chopping.

Mechanical site preparation methods may result in negative indirect effects that include soil erosion or increased leaching of soil nutrients to runoff waters, both are potential impacts to aquatic species and their habitats. However adhering to state BMP and Forest standards, set forth in the DRLRMP (USFS 2003), should minimize these effects.

As described in the above section, leaching of soil nutrients by runoff water is not expected to be above natural conditions. Table 3.3.3.F present the number of acres proposed for drum chopping within each watershed by each alternative.

Site Preparation Burning

Prescribed burning has the potential to directly affect soils by removal of litter and duff, and through the associated fire line construction techniques. Indirect effects from this activity include increased soil erosion or leaching of soil nutrients to runoff waters. Site preparation for burning requires establishing control lines (fire lines) with heavy equipment that can result in negative direct effects by direct contact and degradation of streamside zones and riparian corridors. Negative indirect effects can result from increases in soil erosion. These direct and indirect effects will be mitigated, by adhering to state BMP and Forest standards set forth in the DRLRMP (USFS 2003), and are not expected to effect aquatic species or their habitat. Disturbance of stream banks by fire line construction will be minimized within riparian areas and streamside zones.

A recent study emphasized the response of benthic invertebrates to management. No major differences in water chemistry between managed (thinned and burned) and reference streams were reported. Both showed uniform pH, alkalinity, conductivity, total suspended solids, and dissolved nutrients. Preliminary information suggests that the associated environmental changes may result in positive effects on the abundance/species composition of stream periphyton, but only minor effects on stream invertebrates (Feminella 2000). Such positive effects may be due to slight and temporary increases in nutrients released through surface and subsurface run-off from burned areas. Small and temporary increases may be beneficial to native aquatic biota, especially in streams that are otherwise relatively low in nutrients. However, it is important to ensure that slight nutrient increases do not exceed thresholds when added to cumulative effects of other watershed influences. Excess nutrients can alter normal nutrient cycling to the benefit of more tolerant generalist species, including invasive and non-indigenous species.

There is a minimal chance of any proposed practices resulting in substantial changes in nutrient level. Studies from Auburn University (Feminella 2000) indicate that low intensity thinning and burning with best management practices result in only slight nutrient increases. Utilizing natural and existing man-made barriers in lieu of constructed fire lines greatly reduces the soil erosion potential. Based on estimated soil loss, mitigation measures (see mitigation measures in Chapter 2) and Land Resource Management Plan guidance, site preparation prescribed burning will have minimal effect on aquatic species or their habitat.

Table 3.3.3.I presents the number of acres proposed for site preparation burning within each watershed by each alternative.

Temporary Roads

Studies regarding soil erosion and effects of forestry applications have shown that in many cases logging roads, not the harvesting practice, are responsible for a large amount of the sediment that enters an aquatic environment (Everest et al. 1987). Sources suggest that as much as 90 percent of the total sediment production from forestry operations is from forest roads (Flynn 2002). Another potential impact of forest roads is the direct interface with riparian vegetation and stream channel structure. In areas where stream crossings are required, riparian vegetation is removed. The removal of vegetation destabilizes the banks and may result in bank erosion. If proper mitigation techniques are used, the loss of riparian vegetation should be reduced or avoided.

There will be a limited effect on aquatic species and habitats from soil erosion due to temporary road construction based on mitigation measures and Forest Plan guidance for constructing temporary roads. (See Mitigation Measures - Chapter 2.)

Table 3.3.3.D present the number of proposed miles of temporary roads within each watershed by each alternative.

Reforestation

Reforestation is not expected to impact the aquatic resource when using hand tools for re-establishing vegetation. This project does not propose the use of heavy equipment, fertilizers or herbicides to achieve reforestation. Minimal ground disturbance and long term enhancement of the watershed will ultimately produce a net positive effect on aquatic species and habitats.

Table 3.3.3.N presents the number of acres proposed for planting within each watershed by each alternative.

Alternatives Comparison

This section compares the direct and indirect effects on aquatic resources and habitats of each alternative. The primary concern, or potential effect, for all alternatives is soil erosion resulting in sedimentation of streams. This analysis of alternatives is based on acres treated. Negative effects are not expected to result from any alternative, but the potential for direct and indirect effects does exist. Best management practices can fail in unforeseen cases such as excessive rainfall or illegal use of an area. So, there is a difference in the probability for potential effects among alternatives due to the differences in acres treated by each alternative.

Alternative 1

Alternative 1 has no proposed actions rather than continue forest management operations as they exist under the current forest plan. There would be no scheduled and planned forest management activities under this alternative. However, if existing pine stands are not treated, it is presumed that they would eventually be infested with Southern pine beetles. Control operations would be instituted primarily with “cut and remove” methods. This would ultimately result in clearing of thousands of acres which are currently in loblolly pine plantations. No site preparation would be conducted and treated sites would be allowed to undergo natural succession. There would be more potential for impact to aquatic resources from this alternative based on acreages and methods of treatment, when compared to thinning operations. However under this alternative, the terrestrial resources would realize an increase in early successional habitat. Prescribed burning would continue in manner and acreage similar to that, which is currently being conducted. Potential hazards for wildfire will increase. A large acreage, intense wildfire would have a severe negative impact on aquatic habitats.

Alternative 2

This alternative is more likely to result in negative impacts to aquatic species and habitats because of increased soil erosion potential determined by the number of acreages treated. This stems from the increased amount of temporary roads under this alternative almost double the amount of temporary roads and twice the potential for erosion. If proper mitigation measures are followed the impacts could be minimized. This alternative has a large potential for negative impacts when compared to all other action alternatives.

Alternative 3

Temporary roads are the primary concern due to erosion potential. However this alternative proposes fewer roads and is less likely than alternative two to produce negative impacts on aquatic species and their habitats. Mitigation techniques will be necessary to minimize impacts on aquatic species or habitats from temporary roads.

Alternative 4

Temporary roads are the primary concern due to erosion potential. The reduced acreage associated with this alternative results in less potential for soil erosion as compared to all other alternatives. Mitigation techniques will be utilized to minimize impacts from temporary roads to aquatics. This alternative has the least potential for negative impacts when compared to all other action alternatives.

Alternative 5

Temporary roads are the primary concern due to erosion potential. The increased acreage of annual prescribed burning with this alternative (not site preparation burns) will increase the potential for negative impacts on aquatic species and habitats. These impacts will be slightly greater than those of alternative three where a similar amount of temporary roads are proposed. However the negative impacts from prescribed burning are not as devastating as those produced by temporary road construction so this alternative will have less negative effects than those found in alternative two. Mitigation techniques will be utilized to minimize impacts to aquatics from temporary roads and the prescribed burning regime. Additionally, the increased prescribed burning, which is less dramatic than a wildfire, will reduce the chance of resource damaging wildfire.

Alternative 6

Although this alternative does not employee commercial logging, similar mechanical means of logging, equipment use, number of treated acres, the same amount of temporary roads, and similar BMP's would be utilized. Thus, the concerns related to this alternative (temporary roads and increased prescribed burning) are similar to that of Alternative 3.

Conclusion

The sites proposed for treatment within the scope of this project are typically upland areas that are located on a side slope or on a ridge top. The processes needed to accomplish restoration and thinning have an inherent potential to cause soil disturbance, thus an indirect impact to plants and animals living in an aquatic environment. As noted within the water quality section of this document indirect effects could include sedimentation or increased nutrient levels.

Comparisons of various alternatives reveals that 11 of the 5^{th} level watersheds have some potential for impacts from thinning under Alternative 2, while Alternatives 3, 4, 5 and 6 have potential impacts for only nine 5^{th} level watersheds. The Upper Brushy and Upper Sipsey have the greatest potential for impact due to the number of acres treated in those watersheds and the sensitivity (number of aquatic species of concern present) of those watersheds.

The streams of Bankhead currently are habitat for the many listed species of plants, vertebrates and invertebrates. The water quality analysis and its conclusions note that all watersheds within the analysis area are currently in excellent condition. (See section 3.3.5 Conclusions). Additionally, a watershed threat analysis was made and although the water quality analysis is not focused primarily towards biological resources, the findings have direct applicability. Erosion that results in lowered water quality will have direct relation in impacts to living biological organisms found within streams and watercourses.

Analysis of the Species-Sediment Load Relationship or Index (SSI) indicates that Alternatives 1 and 2 have the greatest potential for impacts to aquatic habitats. Alternatives 3, 5, and 6 have the same SSI values. Alternative 4 has a somewhat lower value because the acreage to be treated is slightly lower. Alternative 1 has a high potential for impacting water quality when large acreages of loblolly pines are infested with Southern pine beetle. Alternative 2 appears to have increased potential for causing a water quality impact to aquatic organisms for the first years of implementation. Alternative 4 would appear to have slightly less impact on aquatic organisms of concern due to the slight reduction of acreages proposed for treatment. However, in subsequent years, Alternatives 3, 4, 5, and 6 level out to approximately the same impact.

Table 3.4.3.A - Sources of Risk and Population Viability by 5th Level Watersheds

Includes status ranking which refers to Federal listing of Threatened (T) or Endangered (E) and Forest Service listing of Sensitive (S) Locally Rare (LR) or Considered for Federal listing (candidate)(CFL).

Species	Status	Watershed								Sources of Risk								Notes
		Upper Sipsey	Lower Sipsey	Upper Brushy	Lower Brushy	Clear Creek	Town Creek	Bear Creek	Flint Creek	Sedimentation	Nutrient loading	Ph	Point Source	Dissolved Oxygen	Flow	Hydro. Alterations	Temperature	
Sternotherus depressus	T	X	X		X	X				Sed.	Nut.	Ph	Ps					Present in Smith Lake-1
Epioblasma brevidens	E																	No records of Current Existence
Epioblasma metastriata	E	X	X	X	X					Sed.	Nut.	Ph			Q			1,2
Epioblasma turgidula	E						X	X	X	Sed.	Nut.	Ph			Q			1,3
Lampsilis altilis	E	X	X	X	X					Sed.	Nut.	Ph			Q			1,2
Lampsilis perovalis	T	X	X	X	X	X				Sed.			Ps					1,2
Medionidus acutissimus	T	X	X	X	X					Sed.	Nut.	Ph			Q			1,2
Medionidus parvulus	E	X	X							Sed.		Ph		Do				1,2
Pleurobema furvum	E	X	X	X	X	X				Sed.				Do				1,2
Pleurobema perovatum	E	X		X	X					Sed.	Nut.	Ph			Q			1,2
Pleurobema plenum	E						X	X	X									3
Ptychobranchus greeni	E	X	X	X	X					Sed.	Nut.	Ph			Q			1,2
Lampsilis orbiculata	E						X	X	X									3
Sagittaria secundifolia	T	X	X	X	X					Sed.	Nut.				Q	HA		1,4,5
Necturus alabamensis	S	X	X	X	X					Sed.		Ph	Ps		Q			1
Etheostoma bellator	S	X								Sed.		Ph	Ps					1,2
Etheostoma douglasi	S	X		X	X					Sed.								1
Obovaria jacksonian	S							X		Sed.			Ps		Q		T	1
Etheostoma tuscumbia	S						X			Sed.		Ph	Ps				T	1
Gomphus hybridus	S																	
Obovaria unicolor	S																	

Species	Status	Watershed								Sources of Risk								Notes
		Upper Sipsey	Lower Sipsey	Upper Brushy	Lower Brushy	Clear Creek	Town Creek	Bear Creek	Flint Creek	Sedimentation	Nutrient loading	Ph	Point Source	Dissolved Oxygen	Flow	Hydro. Alterations	Temperature	
Etheostoma phytophyllum	S					X				Sed.			Ps				T	1,2,6
Etheostoma sp cf. zonistium	CFL	X						X		Sed.				Do			T	1,7
Percina sp. cf. macrocephala	S	X								Sed.								1,7
Hydroptila paralatosa	S	X			X					Sed.								1,7
Rhyacophila carolae	S						X		X	Sed.	Nut.						T	1,7
Elliptio arca	S	X	X					X			Nut.		Ps					1,2
Strophitus subvexus	S	X	X			X				Sed.		pH		Do				1,2
Villosa nebulosa	S	X		X						Sed.		pH		Do				1,2
Aneura maxima	S	X																1
Cheilolejeunea evansii	S	X																1
Pellia X appalachiana	S	X																1
Plagiochila echinata	S	X																1
Radula sullivantii	S	X																1
Riccardia jugata	S	X																1
Jamesianthus alabamensis	S	X	X															1,4,5
Platanthera integrilabia	S															HA		1,3,5,8
Etheostoma zonistium	LR	X						X										1,7
Hemitremea flammea	LR								X									1,3
Elliptio arctata	LR	X		X	X							pH						1,7
Macroclemys temminckii	LR																	No records of Current Existence
Cypripedium pubescens	LR	X	X	X	X			X	X									1,3,5

Table 3.4.3.A - Sources of Risk and Population Viability by 5th Level Watersheds

Table 3.4.3.A (Continued): Sources of Risk and Population Viability Analyzed by 5th Code Watersheds – Guide to note codes

1 - Risks to viability are minimized by project mitigations across all alternatives; Alternative 2 poses the greatest risk to viability, Alternatives 3, 5 and 6 pose moderate risks, Alternative 4 poses the lowest risk to viability.

2- Limited presence increases viability risks.

3- Low risk to viability due to minimal treatments within historical habitat by all alternatives.

4- Risk to viability is low because no alteration to flow and no significant nutrient changes will result.

5- Direct contact with species will be eliminated through riparian area protection.

6- Watershed has historic problems with sedimentation and point source pollution; only a small percentage of Clear Creek watershed is in Forest Service ownership.

7- Low risk to population viability due to Forest Service Ownership of the majority of the watershed.

8- Herbivory and Competition from exotics increase the risk to viability.

3.4.4 Cumulative Effects (Aquatic)

Cumulative effects are the result of a combination of the impacts that have occurred in the past, those that are expected to occur due to the project and those that will likely occur in the future from any reasonably foreseeable action. Cumulative effects may result from actions both on and off Forest Service land. Cumulative effects may result from the combination of multiple actions that have no effect on aquatic environments if they occur individually.

Water quality degradation, particularly sedimentation, is a potential impact to aquatic species and their habitats. The cumulative effects discussed within the Water Quality Section are applicable to understanding the cumulative effects in the aquatic habitats. The analysis showed that four of the watersheds within the Forest Health and Restoration Project received an “excellent” rating. Where a watershed has an excellent rating, the probability or potential is low for adverse effects to aquatic species. Forest Service objectives would be to maintain or improve aquatic health through the implementation of riparian prescriptions. The likelihood of maintaining the excellent rating is high or moderate in areas where forest ownership is high. All seven watersheds attained the excellent ranking when the percentage of land ownership was not applied. Since the streams are currently considered to have this “excellent” rating, the minimal impacts that may arise from this project would have a low probability for an adverse impact on aquatic ecosystems. Following Land and Resource Management Plan guidance, the Forest Service will maintain or improve aquatic health through the implementation of riparian prescriptions and mitigation measures.

Although wetlands are present across the landscape, they will not be impacted by the forest health and restoration project. All proposed treatment areas were planned to be surveyed for presence of wetlands. Outside of streamside management zones, no wetlands were noted during field reviews.

The existing database of known caves within the areas proposed for treatment has been reviewed. Mitigation measures for preserving the unique habitats provided by caves include the reservation of a 200 foot buffer around the entrance to all known caves. Prohibited activities within this buffer include the use of wheeled vehicles or tractors (except on existing roads), mechanical site preparation, vegetation clearing, fire line construction, and/or construction of temporary roads, skid trails or log landings. By combining this buffer with streamside management practices, the impacts to influent caves are minimized. With proper mitigations utilized there should be no significant impacts to cave resources under any of the proposed alternatives.

Current watershed stressors and species viability concerns are primarily a result of historical influences that have reduced distribution and abundance of some species and associated habitats. The effects associated with any of the proposed alternatives are small relative to historical impacts and future external threats. Risks to species viability are minimized through guidance in the Land and Resource Management Plan, by the application of riparian prescriptions, and through mitigation measures. The “Sediment Species Load Relationship or Index (SSI),” as described in the water quality section, are projected to remain the same under each alternative. The SSI is a measurement that characterizes the condition of watersheds with respect to current and future sediment load increases and is dependent on land ownership. The greatest areas for potential effects to aquatic species are within the Sipsey and Brushy watersheds due to the number of acres treated therein. The majority of the lands within these watersheds are under Forest Service ownership; therefore, there are minimal outside influences. Actions implemented through this project will maintain the SSI and Index of Biotic Integrity of all streams considered here.

The Alabama Department of Environmental Management has conducted monitoring activities in streams within Bankhead National Forest. They have utilized a standardized sampling and analysis known as the Index of Biotic Integrity (IBI). The index of biotic integrity method is a tool for evaluating effects on natural ecosystems. Biotic communities act as integrators of multiple stresses over time. This method factors in the species richness and composition, the trophic composition, fish abundance and fish condition to give a numerical rating of the overall biological health of the stream. The streams sampled in 2002 within Bankhead rated from fair to fair/poor condition. This reflects that some of the streams and their endemic fish populations within Bankhead National Forest have been impacted in the past. A possible explanation for the stream conditions is that the region was in extreme drought conditions during 2000 and 2001. Many streams dried up to just a few stagnant pools and the aquatic inhabitants suffered. The samplings were conducted during the summer of 2002. This may not have been ample time for the fish and invertebrate populations to sufficiently recover. Future sampling will provide additional information and insight on stream conditions.

There are some threats of risk to watersheds within the scope of this analysis that are beyond the administrative reach of the Forest Service and are not associated with the forest health and restoration project. Habitat loss, fragmentation, and modification are continual problems facing aquatic species. This project should maintain or improve current habitat distribution that currently exist on Forest Service land and will not contribute to habitat loss, fragmentation or modification.

Threats to stream health exist by the continued pressure of development. Development in rural areas is accompanied by an increase in soil disturbance and the potential for nutrients to enter the aquatic environment. These impacts result from weakly enforced to non-existent regulatory mechanisms regarding erosion control and soil disturbance. Non-point source discharge permits are required on disturbances one acre and larger. Many sites are developed incrementally to avoid permitting requirements. Permit enforcement is on a complaint basis. The impacts of accelerated development associated with Lewis Smith Lake are of increasing concern. The Forest Service has submitted proposals to the Alabama Power Company requesting impact studies as part of the Smith Lake dam relicensing through the Federal Energy Relicensing Commission (FERC).

Alteration of flow is also an issue that is beyond the scope of Forest Service lands and this assessment. The Lewis Smith dam has tremendous impact upon the flows of reaches of the Lower Sipsey, the Lower Brushy, Clear, and Rock Creek watersheds. While this may have beneficial impacts to some species, it possibly has detrimental impacts to others. This issue has been raised in the form of a study request submitted to Alabama Power Company as part of the dam relicensing effort.

Surface mining has had lasting impacts on the landscape throughout the Warrior coal basin. This activity apparently peaked during the late 1980's and early 1990's. Since that time many strip mines have discontinued operations in this area. The last coal mine in the immediate vicinity of the Bankhead ceased operations this year. There are several mines in the process of being reclaimed. These operations are under the oversight of the Alabama Surface Mining Commission.

The tables presented below reveal threats to aquatic environments by watershed, the effects of associated management activities, and the cumulative effects on aquatic environments.

Table 3.4.4.A - Aquatic Habitat Risk Assessment by Watershed

Threats / *Watershed*	Sediment Thinning	Sediment Temporary Roads	Sediment Site Preparation	Nutrients & Sediment Off Forest Development	Mining of Coal	Agricultural Row Crops & Animal Waste	Altered Flow
Sipsey	Marginal increases of sediment production.	Marginal increases of sediment production.	Marginal increases of sediment production for most sites. Slight increase on steep sites. Full recovery within 2 years of activity.	No increase anticipated.	No increase anticipated.	No increase in row crops. Animal agriculture is slightly declining. State regulations on animal waste application in effect.	None anticipated.
Clear	Marginal increases of sediment production.	Marginal increases of sediment production.	Marginal increases of sediment production for most sites. Slight increase on steep sites. Full recovery within 2 years of activity.	Development is accelerating, Increase anticipated.	No current mining permits Reclamation of existing mines adjacent to Clear Creek ongoing.	No increase in row crops. Animal agriculture is slightly declining. State regulations on animal waste application in effect.	Alteration due to Lewis Smith Reservoir, Impacts not fully recognized. Small dam regulates flow during low discharge.

Threats / *Watershed*	Sediment Thinning	Sediment Temporary Roads	Sediment Site Preparation	Nutrients & Sediment Off Forest Development	Mining of Coal	Agricultural Row Crops & Animal Waste	Altered Flow
Brushy	Marginal increases of sediment production.	Marginal increases of sediment production.	Marginal increases of sediment production for most sites. Slight increase on steep sites. Full recovery within 2 years of activity.	Southern portion adjacent to Smith Lake; Development is accelerating, Increase anticipated.	No increase anticipated.	No increase in row crops. Animal agriculture is currently steady. State regulations on animal waste application in effect.	Alteration due to Lewis Smith Reservoir, Impacts not fully recognized.
Smith Lake	Marginal increases of sediment production.	Marginal increases of sediment production.	Marginal increases of sediment production for most sites. Slight increase on steep sites. Full recovery within 2 years of activity.	Development is accelerating, Increase anticipated.	None currently permitted. Abandoned mines have impacted area in past.	Large number of poultry operations present. Lake proper not adversely impacted. State regulations on animal waste application in effect.	This is currently a lake system.

Threats / ***Watershed***	**Sediment Thinning**	**Sediment Temporary Roads**	**Sediment Site Preparation**	**Nutrients & Sediment Off Forest Development**	**Mining of Coal**	**Agricultural Row Crops & Animal Waste**	**Altered Flow**
Upper Bear	Thinning will result in no increase of sediment.	Temporary roads will result in no increase of sediment.	Site preparation will result in no increase of sediment. Full recovery within 2 years.	Slight increase anticipated. Rural residential development is increasing in Franklin and Lawrence counties.	No increase anticipated. Mining operation for other minerals within the watershed.	Large number of poultry operations in watershed below National Forest lands. State regulations on animal waste application in effect.	None anticipated
West Flint	Thinning will result in no increase of sediment	Temporary roads will result in no increase of sediment.	Site preparation will result in no increase of sediment. Full recovery within 2 years.	Slight increase anticipated in watershed below Forest Service lands. Rural residential development is increasing in Lawrence and Morgan counties.	No increase anticipated.	Crop acreage slightly decreasing in Morgan and Lawrence. Livestock numbers slightly increasing. Large number of poultry operations present. State regulations on animal waste application in effect.	None anticipated

Threats / ***Watershed***	**Sediment Thinning**	**Sediment Temporary Roads**	**Sediment Site Preparation**	**Nutrients & Sediment Off Forest Development**	**Mining of Coal**	**Agricultural Row Crops & Animal Waste**	**Altered Flow**
Town	Thinning will result in no increase of sediment	Temporary roads will result in no increase of sediment.	Site preparation will result in no increase of sediment. Full recovery within 2 years.	Slight increase anticipated in watershed below Forest Service lands. Rural residential development is increasing in Lawrence.	No increase anticipated.	Crop acreage slightly decreasing in Colbert Franklin and Lawrence Livestock numbers slightly increasing Large number of poultry operations present State regulations on animal waste application in effect	None anticipated

Threats / ***Watershed***	**Sediment Thinning**	**Sediment Temporary Roads**	**Sediment Site Preparation**	**Nutrients & Sediment Off Forest Development**	**Mining of Coal**	**Agricultural Row Crops & Animal Waste**	**Altered Flow**
Lower Brushy	Thinning will result in no increase of sediment	Temporary roads will result in no increase of sediment	Site preparation practices will result in no increase of sediment on most sites Slight increase on steep sites Full recovery within 2 years	Increase anticipated Potential for increase in southern portion adjacent to Smith Lake	None Anticipated	Minimal impact Some poultry operations present State regulations on animal waste application in effect	Current alteration due to Smith dam Impacts not fully analyzed Possible change for positive in future
Smith Lake	Thinning will result in no increase of sediment	Temporary roads will result in no increase of sediment	Site preparation will result in no increase on most sites Slight increase on steep sites Full recovery within 2 years	Increase anticipated Development is rapidly expanding Future trend is for increase	None permitted currently Abandoned mines have impacted area in past	Large number of poultry operations present Lake proper not adversely impacted State regulations on animal waste application in effect	This is currently a lake system

Threats / Watershed	Sediment Thinning	Sediment Temporary Roads	Sediment Site Preparation	Nutrients & Sediment Off Forest Development	Mining of Coal	Agricultural Row Crops & Animal Waste	Altered Flow
Upper Bear	Thinning will result in no increase of sediment	Temporary roads will result in no increase of sediment	Site preparation will result in no increase of sediment on most sites Slight increase on steep sites Full recovery within 2 years	Slight increase anticipated Rural residential development is increasing in Franklin and Lawrence counties	No increase anticipated Mining operation for other minerals within the watershed	Large number of poultry operations in watershed below National Forest lands State regulations on animal waste application in effect	None anticipated
West Flint	Thinning will result in no increase of sediment	Temporary roads will result in no increase of sediment	Site preparation practices will result in no increase of sediment on most sites Slight increase on steep sites Full recovery within 2 years	Slight increase anticipated in watershed below Forest Service lands Rural residential development is increasing in Lawrence and Morgan counties	No coal mining operations in this area	Crop acreage slightly decreasing in Morgan and Lawrence Livestock numbers slightly increasing Large number of poultry operations present State regulations on animal waste application in effect	None anticipated

Threats / Watershed	Sediment Thinning	Sediment Temporary Roads	Sediment Site Preparation	Nutrients & Sediment Off Forest Development	Mining of Coal	Agricultural Row Crops & Animal Waste	Altered Flow
Town	Thinning will result in no increase of sediment	Temporary roads will result in no increase of sediment	Site preparation practices will result in no increase of sediment on most sites Slight increase on steep sites Full recovery within 2 years	Slight increase anticipated in watershed below Forest Service lands Rural residential development is increasing in Lawrence	No coal mining operations in this area	Crop acreage slightly decreasing in Colbert Franklin and Lawrence Livestock numbers slightly increasing Large number of poultry operations present State regulations on animal waste application in effect	None anticipated

Table 3.4.4.A - Aquatic Habitat Risk Assessment by Watershed

Table 3.4.4.B - Cumulative Effects on Aquatic Environments

Threats	Sediment Thinning	Sediment Temporary Roads	Sediment Site Preparation	Nutrients & Sediment Off Forest Development	Mining of Coal	Agricultural Row Crops & Animal Waste	Altered Flow Regime
Present (1-5 years) Life of the Proposed Action	No increase Forest Service Management guidelines provide protections. Forest Plan requires resource protective mechanisms	No increase Forest Service Management guidelines provide protections. Forest Plan requires resource protective mechanisms	No increase on most sites. Slight increase on steep sites during year of treatment. Full recovery within 2 years. Forest Service Management guidelines provide resource protection. Forest Plan requires protective measures	Increase in vicinity of Lewis Smith Lake and possibly in southern portion of lower Brushy and Lower Sipsey	Recent closure of coal mine in Winston County . No active coal mines adjacent to Forest Service lands	Overall decreases within local area in row crop and animal agriculture	Areas of the lower Sipsey and Lower Brushy are potentially impacted by the upper tailwaters and altered flow regime from Lewis Smith lake and dam.

Threats	Sediment Thinning	Sediment Temporary Roads	Sediment Site Preparation	Nutrients & Sediment Off Forest Development	Mining of Coal	Agricultural Row Crops & Animal Waste	Altered Flow Regime
Future **(Greater than 5 years following implementation of proposed action)**	No increase Forest Plan requirement for protective mechanisms Establishes management direction for a period of 10 – 15 years Less impact from insect damages to upland forest.	No increase Forest Plan requirement for protective mechanisms Establishes management direction for a period of 10 – 15 years Roads obliterated	No increase. Sites will completely recover within 1- 3 years Forest Plan requirement for protective mechanisms Establishes management direction for a period of 10 – 15 years	Development is cyclic but trend of development is increasing Increased demand for rural and lake property likely State and County wide regulations regarding development and construction BMP's needed. Full enforcement of health department regulations for septic tank installation and maintenance	Future operations depend upon price of coal. Most surface mines are closing or not expanding ASCM regulates resource impacts	Statewide and nationwide trend indicates the area around the National Forest will have decreasing amounts of row crops and livestock operations. This can change with commodity prices and government controls.	Relicensing of Smith Lake dam may result in slightly improved conditions within parts of the Lower Sipsey and Lower Brushy watersheds. The continuing impact of the dam remains.

Threats	Sediment Thinning	Sediment Temporary Roads	Sediment Site Preparation	Nutrients & Sediment Off Forest Development	Mining of Coal	Agricultural Row Crops & Animal Waste	Altered Flow Regime
Cumulative Effects of Proposed Action	Thinning of overstocked stands completed. Practices of the Forest Health & Restoration project promote healthy watersheds within the forest. Forest Plan protective mechanisms provide protection for aquatic habitat.	Temporary roads obliterated. Forest Health & Restoration project promotes healthy watersheds within the forest. Forest Plan protective mechanisms provide protection for aquatic habitat.	All sites restored to native forest cover types. Forest Plan protective mechanisms provide protection for aquatic habitat.	Increased demand for rural and lake property for residential development likely. Actual impacts unknown without data on development in progress and assessment of future.	No anticipated effects from coal mining. Trend is to develop underground reserves and overseas sources.	Reduction in row crop, poultry and livestock operations would have decreasing impact upon aquatic habitats. Increasing use of government programs continue to remove marginal lands from production.	Impact of Smith Lake dam will remain. Some alteration of water flow may be realized in association with relicensing in 2007. Lower Sipsey and Lower Brushy watersheds would be affected. Dams on Clear and Brushy remain in place.

Table 3.4.4.B - Cumulative Effects on Aquatic Environments

3.4.5 Monitoring

Monitoring and evaluation for aquatic resources will follow those set forth in the Forest Land Management Plan. Management activities will be evaluated for compliance with Forest standards (BMP's) to ensure minimizing negative impacts. Monitoring stream habitat conditions will be conducted in concert with ADEM stream health IBI standards; compliance will be determined by ensuring that the current IBI ratings are maintained or improved. The district's wildlife biologist and technicians will participate in periodic ground surveys and status updates via current literature and research to ensure that management activities in place on the Bankhead do not create viability concerns. The conditions and trends of riparian area, wetland, and floodplain functions will be addressed through the adoption of BMP practices to ensure that they meet Forest, State and Federal requirements.

3.5 Terrestrial Wildlife and Plant Resources

3.5.1 Issues

Diverse populations of wildlife, including many species of landbirds, forest dwelling bats and a well-publicized population of white-tailed deer and eastern wild turkey are found in the Bankhead National Forest. Many rare plants are found in the Bankhead including ginseng and yellow lady's slippers. Issues identified during the scoping process include:

- Impacts of the proposed treatments on species of plants and wildlife, which are listed as protected by the Endangered Species Act of 1973 as amended, Forest Service Regional Forester's Sensitive Species list, and locally rare species list.
- Impacts of the proposed treatments on management indicator species (MIS).
- The dispersal of early successional habitat (grass/forb and shrub/seedling/sapling and glades, prairies and woodland associations) throughout the forest.

Section 3.1 (Vegetation, Resources) addresses the impact of alternatives to the forest communities in the affected area.

3.5.2 Affected Environment

The wildlife and rare plant habitats affected by the Forest Health and Restoration Project are described in this section. The Desired Future Condition (DFC) will determine the types of wildlife habitat that will be available on the area in the future. Rare communities (e.g. riparian areas, glades, rock outcrops, wetlands and rock houses) are potentially found in all of the forest community types being considered.

Past and Current Conditions

Past management actions and policies have resulted in unhealthy forests and limited wildlife habitat. In many cases, forest stands are void of any productive wildlife habitat. The loblolly pine stands are too dense for adequate wildlife habitat; the overstory is too thick for bats to utilize as foraging sites and for turkey to use at any period in their life cycle. Dense loblolly pine stands lack a developed understory which prairie warblers require and forage for white-tailed deer. The current level of overstocking prevents prescribed burning from being an effective tool for maintaining native ground cover. Currently, overstocked stands do not offer quality wildlife habitat for a diversity of species because such factors as appropriate understory, nesting cover, browse and insect production are limited.

The forest was recently hit by a large Southern Pine Beetle (SPB) epidemic largely contributing to the unhealthy conditions of the forest. Some of the SPB infected areas were treated using a cut and remove method of control; while others were not treated. One indirect and unexpected benefit of the infestation is SPB areas currently provide wildlife habitat components including early successional vegetation, open forest canopies, hardwood introduction, and standing pine snags. Early successional vegetation provides browse for white tailed deer and nesting and foraging areas for neotropical migratory landbirds and Eastern wild turkey. Open forest canopy provides proper structure for many species of birds including Indigo bunting, Eastern kingbird, wood thrush, Eastern wild turkey, and several species of bats. Newly introduced hardwoods provide nesting and foraging habitats. Species such as pileated woodpecker, brown-headed nuthatch, Acadian flycatcher, red-bellied woodpecker, and many species of bats utilize the remaining standing snags or dead trees. These sites are ephemeral due to the temporary nature of standing dead trees and the lack of future management decisions. These SPB sites and the benefits they provide may continue to provide habitat for approximately 3 to 5 years.

Terrestrial Plant and Wildlife Species

This section addresses several categories of wildlife. Included are those species listed by the U.S. Fish and Wildlife Service (FWS) under the Endangered Species Act of 1973 as a threatened, endangered or candidate species; those listed by the Forest Service Regional Forester as regionally sensitive, and locally rare. Sensitive and locally rare species are designated based on viability concerns identified by The Nature Conservancy's Natural Heritage Program. The inclusion of Sensitive and Locally Rare species is a means to preclude any trend toward the necessity of their being proposed for listing as threatened or endangered by the FWS. All listed species are found in table 3.5.2.A. This list is based upon the Southern Region Sensitive Species, revision January 2002 and approved revisions.

Federally listed proposed, endangered, or threatened species receive the full protection of the Endangered Species Act. The Forest Service has responsibility as a federal agency to recover or contribute to the recovery of a listed species according to established recovery plans and through consultation with the US Fish and Wildlife Service. *Forest Service Sensitive species* include species that have a Nature Conservancy global rank of G1, G2, or G3; a national rank of N1, N2, or N3; or a subspecies rank of T1, T2 or T3. These species have range-wide viability risks and have potential for becoming federally listed in the future due to their rarity. *Locally Rare species* are considered rare on individual forest planning units. Rarity is primarily due to the planning unit on the edge of a species range or because the species is considered endemic to the area. At issue for these species is maintaining the species continued persistence in the planning area. Species are included as locally rare based on Forest Service coordination with state Fish and Wildlife Agencies and state Natural Heritage Programs. The species that fall within one of these categories can be found in table 3.5.2.A.

Major Game Species are recreationally important terrestrial wildlife species. Harvest regulations for these game species are established and enforced by the Alabama Department of Conservation and Natural Resources, Division of Wildlife and Freshwater Fisheries. Annual harvest data is recorded on the Black Warrior Wildlife Management Area within the Bankhead National Forest. The species that fall into this category can be found in table 3.5.2.B.

High Interest Species have been identified through several conservation organizations and planning documents. The species selected for inclusion in this category were identified in Partners In Flight's Interior Low Plateaus, East Gulf Coastal Plain, and Southern Ridge and Valley Bird Conservation Plans. Table 3.5.2.C lists the species recognized as High Interest Species on the Bankhead National Forest.

The remaining species considered are included in the *Ecological Indicators Species* group. Ecological indicators are plants and animal species whose presence is uniquely tied to an ecosystem, and generally permits the identification of the ecological type or ecological unit. These species are monitored annually through landbird monitoring and breeding bird surveys.

MIS data are located in the project file and were used in the effects analysis presented in this document. For a list of Ecological Indicator Species refer to table 3.5.2.D.

Management Indicator Species (MIS) selected for the Bankhead National Forest are found within all of the categories listed above. MIS are plant and animal species, communities or special habitats selected for emphasis in planning and which are monitored during forest plan implementation in order to assess the effects of management activities on their populations and the populations of other species with similar habitat needs which they may represent. Management Indicator Species are identified in Tables 3.5.2.B, 3.5.2.C, and 3.5.2.D.

Site-specific surveys were conducted for plants that are listed as proposed, endangered, threatened, sensitive, and locally rare species (PETS) and for potential habitat for PETS species. Survey results are located in the project file.

Site-specific surveys were not conducted on MIS species for this project. MIS data are located in the project file and were used in the effects analysis presented in this document. Annual monitoring is conducted at the District, Forest, and Regional levels. See section 3.5.5 Monitoring for additional information.

Table 3.5.2.A - Threatened, Endangered, Sensitive and Locally Rare Species

Common Name	Scientific Name	Status	Habitat
Tennessee Yellow Eyed Grass	***Xyris tennesseensis***	**E**	**11**
Red Cockaded Woodpecker	***Piciodes borealis***	**E**	**17**
Leafy Prairie Clover	***Dalea foliosa***	**E**	**6**
Indiana bat	***Myotis sodalis***	**E**	**1**
Gray bat	***Myotis grisescens***	**E**	**1**
Mohr's Barbara's Buttons	***Marshallia mohrii***	**T**	**2**
Lyrate Bladderpod	***Lesquerella lyrata***	**T**	**6**
Eggert's Sunflower	***Helianthus eggertii***	**T**	**8**
Bald Eagle	***Heliaeetus leucocephaelus***	**T**	**11**
Alabama streak-sorus fern	***Thelypteris pilosa var. alabamensis***	**T**	**7**
White fringeless orchid	***Platanthera integrilabia***	**S-C**	**2**
Small flowered buckeye	***Aesculus parviflora***	**S**	**18**
Yellow fringeless orchid	***Platanthera integra***	**S**	**2**
Tennessee Milkvetch	***Astragalus tennesseensis***	**S**	**6**
Spreading yellow false foxglove	***Aureolaria patula***	**S**	**7**
Scott's Spleenwort	***Asplenium x ebendoides***	**S**	**7**
Riverbank bush-honeysuckle	***Diervilla rivularis***	**S**	**11**
Rafinesque's Big-eared Bat	***Corynorhinus rafinesquii***	**S**	**10**
Nevius' stonecrop	***Sedum nevii***	**S**	**7**
Menge's fameflower	***Talinum mengesii***	**S**	**6**
Little mountain meadow rue	***Thalictrum mirabile***	**S**	**7**
Limestone Fameflower	***Talinum calcaricum***	**S**	**6**
Lanceleaf Trillium	***Trillium lancifolium***	**S**	**11**
Jeweled Trillium	***Trillium simile***	**S**	**18**
Gorge filmy fern	***Hymenophyllum tayloriae***	**S**	**7**
Fleshyfruit Gladecress	***Leavenworthia crassa***	**S**	**6**
Clammy Locust	***Robina viscosa***	**S**	**17**
Butternut	***Juglans cinerea***	**S**	**18**
Bryson's sedge	***Carex brysonii***	**S**	**18**
Blue Ridge catchfly	***Silene ovata***	**S**	**7**
Alabama snow-wreath	***Neviusia alabamensis***	**S**	**6**
Alabama skullcap	***Scutellaria alabamensis***	**S**	**7**

Common Name	Scientific Name	Status	Habitat
Alabama larkspur	*Delphinium alabamican*	S	6
Alabama Gladecress	*Leavenworthia alabamica var. ala*	S	6
Duck River Bladderpod	*Lesquerella densipila*	S-H	6
A liverwort	*Aneura maxima*	S	11
A liverwort	*Cheilolejeunea evansii*	S	11
A liverwort	*Pellia X appalachiana*	S	11
A liverwort	*Plagiochila echinata*	S	11
A liverwort	*Radula sullivantii*	S	11
A liverwort	*Riccardia jugata*	S	11
Alabama Jamesianthus	*Jamesianthus alabamensis*	S	11
Yellow Trout Lily	*Erythronium umbilicatum ssp umb.*	LR	18
Yellow lady's slippers	*Cypripedium pubescens*	LR	18
Winter Grapefern	*Botrychium lunarioides*	LR	12
Wild hyacinth	*Camassia scilloides*	LR	6
White Trout Lily	*Erythronium albidum*	LR	18
Wherry's Catchfly	*Silene caroliniana spp wherryi*	LR	19
Weft fern	*Trichomanes intricatum*	LR	7
Wahoo	*Euonymus atropurpurea*	LR	18
Twinleaf	*Jeffersonia diphylla*	LR	18
Toadshade Trillium	*Trillium sessile*	LR	18
Three-corner prairie clover	*Dalea carnea var gracilis*	LR	6
Sweet pinesap	*Monotropsis odorata*	LR	10
Sunnybells	*Schoenolirion croceum*	LR	6
Small-head gayfeather	*Liatris microcephala*	LR	19
Silky Camellia	*Stewartia malacodendron*	LR	18
Seepage Salamander	*Desmognathus aeneus*	LR	21
Royal Catchfly	*Silene regia*	LR	6
Round leaved firepink	*Silene rotundifolia*	LR	7
Rock clubmoss	*Huperzia porophilla*	LR	7
Puttyroot	*Aplectrum hyemale*	LR	18
Prairie Trillium	*Trillium recurvatum*	LR	18
Pinnate-lobed Black-eyed Susan	*Rudbeckia triloba var pinnatiloba*	LR	7
Pink lady's slippers	*Cypripedium acaule*	LR	12
Pinesap	*Monotropa hypopithys*	LR	18
Nestronia	*Nestronia umbellula*	LR	19
Mountain Camellia	*Stewartia ovata*	LR	11
Little-leaved alumroot	*Huechera parviflora var puberula*	LR	18
Large whorled pogonia	*Isotria verticillata*	LR	10
Green Salamander	*Aneides aeneus*	LR	7
Grass-of-Parnassus	*Parnassia asarifolia*	LR	11
Goldie's fern	*Dryopteris goldiana*	LR	18
Golden seal	*Hydrastis canadensis*	LR	18
Ginseng	*Panax quinquefolia*	LR	18
Gattinger's prairie clover	*Dalea gattingeri*	LR	6
Dwarf bristle fern	*Trichomanes petersii*	LR	7
Dutchman's breeches	*Dicentra cucullaria*	LR	18
Diana Fritillary	*Speyeria diana*	LR	11
Columbo	*Swertia caroliniensis*	LR	18
Broadleaf Barbara's Buttons	*Marshallia trinervia*	LR	11
Blue ridge trillium	*Trillium stamineum*	LR	18
Bent Trillium	*Trillium flexipes*	LR	18
Allegheny Spurge	*Pachysandra procumbens*	LR	18

Common Name	Scientific Name	Status	Habitat
Alabama Sandwort	*Minuartia*	LR	6
A prairie clover	*Dalea sp.*	LR	6
Alabama Grapefern	*Botrychium jenmanii*	LR-H	8

Table 3.5.2.A - Status Codes

E= Listed as endangered by the FWS.
T= Listed as threatened by the FWS.
S= Classified as Sensitive by the Forest Service designated by the Regional Forester.
LR= Classified as Locally Rare by the Forest Service designated by the Natural Heritage Program of the Nature Conservancy.
C= Species that are being considered for addition to Threatened or Endangered list.
H= Documented historical range of habitat.

Table 3.5.2.A - Habitat Associations
1= Cave Habitats
2= Wetland (Bog) Habitats
6= Glades, Prairies, and Woodland Habitats
7= Rock Outcrop and Cliff Habitats
8= Grass/Forb Habitats
10= Mid- to Late- Successional Deciduous Forest Habitats
11= Forest Riparian Habitats
12= Habitat Generalist
13= Area Sensitive Mid- and Late-Successional Deciduous Forest Habitats
17= Southern Yellow Pine Forests and Woodland Habitats
18= Mixed Mesic Forest Habitats
19= Mixed Xeric Forest Habitats
20= Shrub/Seedling/Sapling Habitats
21= Seeps and Spring Habitats

Table 3.5.2.B - Major Game Species.

Common Name	Scientific Name	Status	Habitat
Eastern Cottontail	*Sylviagus floridanus*	GS	8
Northern Bobwhite	*Colinus virginianus*	MIS/GS	8
Gray Squirrel	*Sciurus carolinensis*	GS	10
Fox Squirrel	*Sciurus niger*	GS	10
White-tailed Deer	*Odocoileus virginianus*	MIS/GS	12
Eastern Wild Turkey	*Meleagris gallopavo*	MIS/GS	12

Status Codes
GS= Game Species
MIS= Management Indicator Species

Habitat Associations
Same as Table 3.5.2.A

Table 3.5.2.C- High Interest Species.

Common Name	*Scientific Name*	Status	Habitat
Bachman's Sparrow	*Aimophila aestivalis*	HI	8
Field Sparrow	*Spizella pusilla*	HI	8
Blue-winged Warbler	*Vermivora pinus*	HI	20
Louisiana Waterthrush	*Seiurus motacilla*	HI	11
Wood Thrush	*Hylocichla mustelina*	MIS/HI	13
Cerulean Warbler	*Dendroica cerulea*	HI	13
Hooded Warbler	*Wilsonia citrina*	MIS/HI	13
Yellow-throated Warbler	*Dendroica dominica*	HI	13
Eastern Wood-Pewee	*Contopus virens*	HI	10
Brown-headed nuthatch	*Sitta pusilla*	MIS/HI	17
Prairie Warbler	*Dendroica discolor*	MIS/HI	20
Whip-poor-will	*Caprimulgus vociferus*	HI	10
Chuck-will's-widow	*Caprimulgus carolinensis*	HI	10
Worm-eating Warbler	*Helmitheros vermivorus*	HI	13

Status Codes
HI= High Interest Species
MIS= Management Indicator Species

Habitat Associations
Same as Table 3.5.2.A

Table3.5.2.D - Ecological Indicator Species.

Common Name	Scientific Name	Status	Habitat
Little bluestem	*Schizachyrium scoparium*	MIS/EI	6
Broomsedge bluestem	*Andropogon tenarius*	MIS/EI	6
Virginia bluestem	*A. virginicus*	MIS/EI	6
Milkweeds	*Asclepias spp.*	MIS/EI	6
Scarlet Tanager	*Piranga olivacea*	MIS/EI	13
Acadian Flycatcher	*Empidonax virescens*	MIS/EI	11
Swainsons Warbler	*Limnothlypis swainsonii*	MIS/EI	13
Yellow-breasted Chat	*Icteria virens*	MIS/EI	20
Pileated Woodpecker	*Dryocopus pileatus*	MIS/EI	13
Pine Warbler	*Dendroica pinus*	MIS/EI	17

Status Codes

EI= Ecological Indicator Species
MIS= Management Indicator Species

Habitat Associations
Same as Table 3.5.2.A

Habitat Associations

Many wildlife species, in particular birds, are adapted to certain successional conditions and/or certain forest vegetation types. The forest provides birds with food to eat and appropriate cover to successfully mate, nest and raise their young. Bird species are adapted to conduct their life functions within a certain successional condition or vegetation type is the basic assumption of “community associates or habitat associations.” It has been assumed that the knowledge of these habitat associations could be successfully used to predict the consequences of land management activities due to changes in the forest stand (Hamel 1996). In other words, within those habitats where favorable conditions are present, the birds will be present. It is presumed that these habitats will provide suitable to optimal conditions for the associated species. Forest successional stages are the determining factor for presence, distribution, and abundance of a wide variety of wildlife species (DEIS for the Revised Land and Resource Plan, NF’s in AL 2003).

Through the Southern Appalachian Assessment (SAA), an ecosystem based approach to planning and management of natural resources on National Forest System lands was identified for use in development of Forest Plans (Land and Resource Management Plans). The approach also addresses diversity, species viability, threatened and endangered species recovery and recreational fish and wildlife opportunities. Through this approach four specific issues related to plant and wildlife species were identified: mix of terrestrial habitats; federally listed threatened and endangered species and Forest Service sensitive species; aquatic habitats and species; and rare communities. An analysis tool to compare the effects of alternatives was developed through this process and has been applied in this effects analysis/alternatives evaluation on terrestrial plants and animals.

An objective of this Forest Health and Restoration Project is to provide for diversity and viability at the ecosystem (landscape) level and the species level by providing communities (wildlife and plant habitats) across the landscape that are not well represented on private lands. It is not practical or reasonable to identify and emphasize all individual plant and animal species, which occur on the Bankhead National Forest. For this reason, alternate “coarse and fine filter” approaches are used to address elements of ecosystem and species diversity. The theory is that most plant and animal species can be maintained by providing a mix or representation of the variety of habitat conditions through the coarse filter approach. However, the coarse filter approach alone may not address (1) some species requirements, (2) legal mandates related to species viability or recovery, or (3) species of particular interest to the public or natural resource managers. For this reason a fine filter component is also used to focus on individual species or habitat associations.

Coarse Filters- The ecosystem elements used in this analysis include broad forest community types, forest successional classes, old-growth forests, and rare community types.

The forest community types, associated forest successional classes, and old-growth forests are described in Section 3.1 (Vegetation). The broad forest communities or Desired Future Conditions (DFCs) that will be represented on the Bankhead National Forest include:

- Dry-Mesic Oak Forests
- Dry and Dry-Mesic Oak-Pine Forests
- Mixed Mesophytic Forests
- Conifer-Northern Hardwood Forests
- River Floodplain Hardwood Forests
- Dry and Xeric Oak Forest and Woodlands
- Xeric Pine and Pine-Oak Forest and Woodlands (Shortleaf Pine/Bluestem Woodlands)
- Upland Longleaf Pine/Bluestem Woodlands

The rare community types include:

- Cave Habitats
- Wetland (Bog) Habitats
- Glades and Prairie Habitats
- Rock Outcrop and Cliff Habitats
- Forest Riparian Habitats

A significant finding in the SAA involved the importance of rare community types to federally listed species and Forest Service sensitive species. Terrestrial plant and wildlife species associated with the rare community types listed above are not included in this evaluation of effects of alternatives. These rare communities and their associated species will be protected through mitigation measures. They will be identified and delineated prior to treatments and protected on the individual project level during implementation. This will result in continued maintenance of these communities and associated species and is independent of the alternatives associated with this project.

Fine Filters- As previously stated, it is not practical or reasonable to identify and emphasize all individual plant and animal species occurring on the Bankhead National Forest. To address this, a set of criterion was used to select species requiring some level of consideration in the project. These criteria were aimed at (1) meeting the Agency's legal mandates under NFMA specifically related to viability and biological diversity, (2) meeting the Agency's legal mandates under the ESA for the recovery of federally listed species, and (3) addressing social uses of wildlife, fish, and plant resources related to recreation hunting, fishing and viewing activities. If a species occurs or has potential to occur on the Bankhead National Forest, it was included in the list of species if it met one of the following criteria:

- Federally listed Proposed, Endangered, or Threatened Species (see table 3.5.2.A)
- Forest Service Sensitive Species (see table 3.5.2.A)
- Locally Rare Species (see table 3.5.2.A)

- Major Game Species (see table 3.5.2.B)
- High Interest Species (see table 3.5.2.C)
- Species with Demanding Habitat Requirements (see table 3.5.2.A)
- Ecological Indicator/Keystone Species (see table 3.5.2.D)

Refer to the tables of species groups to determine species habitat associations. These are listed numerically in the key following table 3.5.2.A. For example, small flowered buckeye is a mixed mesic forest habitat associate (#18). The following Table 3.5.2.E displays the relationship between the species habitat associations and the broad forest community types (DFC's). The DFC's/broad forest community types are directly related to species habitat associations, and several species habitat associations may be included in each DFC.

Suitable habitat for Habitat Generalists may be found in several of the DFC's, and effects on individual generalists are discussed in the effects section. Additionally, the plants and animals associated with rare communities (habitat association # 1, 2, 6, 7, 11 and 21) will be protected and will not be affected by any alternatives. Site-specific surveys, GIS coverages, and Forest Service records have been used to identify these rare communities. They will be delineated (flagged) and monitored through contract administration and by biological staff during all treatments associated with this project. Refer to mitigation and monitoring sections for more information.

Desired Future Conditions	Habitat Associations
Mixed Mesophytic Forests	Area Sensitive Mid- and Late-Successional Deciduous Forest Associates (Area 1) (13)
	Mid- and Late-Successional Deciduous Forest Associates (10)
	Mixed Mesic Forest Habitat Associations (18)
Dry Mesic Oak Forests	Area Sensitive Mid- and Late-Successional Deciduous Forest Associates (Area 1) (13)
	Mid- and Late-Successional Deciduous Forest Associates (10)
	Mixed Mesic Forest Habitat Associations (18)
Dry & Dry-Mesic Oak-Pine Forests	Mid- and Late-Successional Deciduous Forest Associates (10)
	Mixed Mesic Forest Habitat Associations (18)
Dry& Xeric Oak Forests and Woodlands	Glades, Prairies, and Woodland Habitat Associates (6)
	Grass/Forb Habitat Forests Associates (8)
	Mid- and Late-Successional Deciduous Forest Associates (10)
	Mixed Xeric Forest Habitat Associates (19)
	Shrub/Seedling/Sapling Habitat Associates (20)
Xeric Pine-Oak Forests and Woodlands (Shortleaf pine/bluestem)	Grass/Forb Habitat Forests Associates (8)
	Glades, Prairies, and Woodland Habitat Associates (6)
	Shrub/Seedling/Sapling Habitat Associates (20)
	Southern Yellow Pine Forests and Woodland Habitat Associates (17)
Longleaf pine/bluestem Woodlands	Grass/Forb Habitat Forests Associates (8)
	Glades, Prairies, and Woodland Habitat Associates (6)
	Shrub/Seedling/Sapling Habitat Associates (20)
	Southern Yellow Pine Forests and Woodland Habitat Associates (17)

Table 3.5.2.E - Crosswalk between DFC's and Habitat Associations

3.5.3 Environmental Effects

In the action alternatives, proposed treatments would occur in loblolly pine stands that span 15 to 45 years of age and in areas treated for southern pine beetle control (southern pine beetle areas) 10 acres and larger.

These activities have the potential to cause the following direct effects to wildlife:

- Alter current stocking density of forest cover
- Change forest cover types and tree species composition within stands.
- Provide early successional habitat for a period of three to five years
- Change forest structure

These activities have the potential to result in the following indirect effects:

- Alter amounts and distribution of early successional vegetation
- Provide additional and alter existing nesting areas for landbirds
- Provide additional and alter existing forage and cover habitat

Direct and Indirect Effects of Thinning

Thinning is a proposed practice for all but the “no action” alternative. The purpose of thinning is to reduce current stocking density (basal area) by removing trees. Thinning will affect the volume of vegetative cover, stocking and composition of the stand.

Thinning restores wildlife habitat by changing the physical structure of the stand allowing for increased wildlife movement within stands. Thinning will increase forest habitat use by terrestrial wildlife simply because the stand is more navigable. Bats use areas for foraging that allow flight around and between trees. Thinned stands will provide more opportunities for nesting and foraging. Turkey require brood habitat that is sufficiently open. Open brood habitat allows for the adults and young poults to forage easily, a clear field of vision for brood hens, and an abundance of insects. None of these features are found in an unthinned pine plantation (Jones 2000). A lack of palatable browse for white-tailed deer is related to the low light levels on the forest floor.

Thinning activities have the potential for direct negative effects on slow moving wildlife species and rare plant communities. Slow moving species may be negatively affected on an individual basis although the number of individual occurrences is expected to be extremely low. Logging equipment could kill individuals if direct contact is made. Stands have been inventoried for rare plants and rare plant communities as a part of this EIS process. Individual plants and communities have been identified and will be protected during thinning operations; therefore, negative impacts to rare plants from thinning are not expected.

An open canopy will stimulate the growth of native legumes, forbs and grasses. This will result in improved browse, nesting cover and insect production. The combination of thinning and prescribed burning stimulates the production of herbaceous vegetation and other plants that provide food and cover for wildlife. Without thinning overstocked loblolly stands, quality habitat for deer, turkey and quail (management indicator species) will decrease. While some amount of brushy cover for these species is desirable, the variety of shrub browse, grasses and forbs they depend on to meet their annual needs is not currently available.

Thinning would also allow prescribed burns to be more effective in restoring and maintaining native ground cover by decreasing canopy closure. Thinning loblolly pines in coordination with effective prescribed burning will result in improved quality of brood rearing habitats for wild turkey and quail because of decreased brush and increased open areas. Thinning in combination with prescribed burning would result in an overall positive long-term effect for wildlife species associated with an early successional habitat type such as deer, turkey, and quail. There would be a beneficial compounding effect to wildlife populations by eliminating temporal and spatial habitat gaps persisting on the landscape. The treatments will result in more contiguous habitats that are developed concurrently over the next 5 years. Thinning will result in overall benefits to the current habitats.

No direct effects on any threatened, endangered, sensitive, or locally rare terrestrial wildlife species are anticipated. Thinnings are proposed within the general vicinity of known endangered bat caves. Gray and Indiana bats are not expected to be present in overstocked stands of loblolly pine, as optimal/suitable habitat is abundant throughout the forest. Standards set forth in the Biological Opinion (Wilson 1999) or the Forest Land and Resource Management Plan for the National Forests in Alabama will be adhered to when planning and conducting thinnings in the vicinity of known endangered bat caves, whereby diminishing the possibility of directly effecting endangered bats (Draft FLRMP 2003, Pages 2-26 through 2-29). Thinning will have a positive indirect effect on bats by opening stands allowing for increased foraging and roosting habitat to develop. Refer to Biological Assessment, Biological Opinion (Wilson 1999), and the Draft FLRMP (2003) for a discussion of canopy cover and suitability for Indiana bats.

Direct or indirect effects to green or seepage salamanders, two locally rare species, are not anticipated. The green salamander is associated with moist rock features, which were noted during the inventory for rare plant communities and will be protected during thinnings. Seepage salamanders are associated with moist hardwood leaf beds near springs, seeps, or streams. Riparian and streamside management zone guidelines will protect this species from any direct or indirect impact associated with thinning (Wilson 1995).

There are no direct effects anticipated for pileated woodpecker and wood thrush because the overstocked loblolly pine stands do not provide optimal habitat for these species. There is potential for direct effects to individual pine warblers. This species uses pine forests in a variety of conditions, including fairly dense stands. Thinning during the nesting season could cause direct individual mortality and nest failure.

Indirect effects to pileated woodpeckers are expected to be generally positive. Pileated woodpeckers require extensive, mature forest with snags present. Thinning in combination with prescribed burning will improve overall forest health, allowing for increased growth (maturity) of stands across the landscape. Prescribed burning of thinned stands may create additional snags, benefiting pileated woodpeckers and other snag dependent species.

Wood thrush requires deciduous or mixed forests with a well developed deciduous understory and is frequently encountered in pine forests. This bird nests in shrubs, saplings or trees. Wood thrushes glean invertebrates from dead leaves on the forest floor and from shrubs and low trees. Thinning in combination with prescribed burning will result in the development of a deciduous understory. This will indirectly benefit wood thrushes by providing feeding and nesting areas.

Pine warblers are found in a variety of pine forest conditions, including fairly dense stands, open stands, and middle-aged to mature pines. This bird feeds by gleaning insects in the crowns of pine trees. Thinning and prescribed burning will indirectly benefit this species as forest health improves and pine stands mature across the forest's landscape. Foraging opportunities for the pine warbler within these stands will increase as stands open up and crowns develop (Hamel 1992).

Tree retention guidelines are described in the Land and Resource Management Plan or the 1999 Biological Opinion for Indiana and Gray Bats and will be adhered to throughout this project, depending upon which document is applicable at time of treatment. The Draft Revised Plan has guidelines for snag and live tree retention for Indiana bat habitat within various areas of the forest.

Direct and Indirect Effects of Restoration of Southern Pine Beetle Areas

The primary objective of restoration of southern pine beetle areas is to establish native forest community types with long-term sustainability. Restoring these stands to native community types (DFCs) will provide long term, valuable wildlife habitat because particular tree species are planted and stocking rates controlled. Tree species selected for planting to achieve the native forest community types will provide foraging and nesting opportunities for wildlife, while providing appropriate structure and stand composition for suites of wildlife species. This is discussed in detail in the cumulative effects section of this chapter.

Restoration site preparation methods that will be employed in some alternatives include drum chopping and prescribed burning. Site preparation activities could directly affect slow moving wildlife species and rare plant communities by contact mortality and community deterioration. Stands have been inventoried for rare plants and rare plant communities as a part of this EIS process, and will be protected during site preparation operations. Very few individuals are expected to be directly impacted by site preparation, there will be minimal population viability concerns due to mitigation measures.

Standing dead snags are essential for species such as pileated woodpecker, brown-headed nuthatch, red-bellied woodpecker, and many species of bats. Standing dead pine trees in southern pine beetle areas will be retained during restoration as required by the Indiana and Gray Bat Biological Opinion (Wilson 1999) or the Draft FLRMP (2003), which ever document is applicable at the time of treatment. Unfortunately these snags are ephemeral due to the unstable nature of standing, dead trees. However, standing or fallen snags are prevalent on the landscape and will continue to persist due to natural causes. During southern pine beetle suppression activities certain hardwood trees were retained for bat habitat. Hardwood trees will be retained during restoration, as required by the Indiana and Gray Bat Biological Opinion (Wilson 1999) or the Draft FLRMP (2003), which ever document is applicable at the time of treatment. Certain hardwood trees provide potential roosting habitat for Indiana bats, where they occur.

All of the areas proposed for restoration have previously been treated for southern pine beetles by a variety of treatment actions; at that time surveys were conducted for Threatened, Endangered, Sensitive and Locally Rare species (PETS). In addition to the previous surveys, all other sites proposed for site preparation activities have been surveyed for PETS plants as a part of this EIS process. (Refer to the Biological Assessment and the Biological Evaluation in the Appendix and the project file for additional information). Any PETS plants present have been identified and rare plant communities will be protected during site preparation activities. There is the potential for direct negative effects to individual plants during drum chopping and site prep burning. Some of these effects may include mortality and setting back reproduction or growth rates temporarily. These impacts should not result in trends toward federal listing of species or population viability concerns. Site preparation may result in a positive effect for Leafy prairie-clover, Eggert's sunflower, lyrate bladder pod, if they are present, by reducing encroachment and allowing for full sun (effectively enhancing their habitat).

Indirect effects resulting from restoration activities are not expected to induce negative impacts to PETS plants. However long term impacts are noted in the cumulative effects section.

Direct effects to green or seepage salamanders, two locally rare species, are not anticipated. During inventory for rare plant communities the moist rock features utilized by green salamanders were noted and will be protected during drum chopping. These features normally will not carry fire due to lack of combustible material and moisture. Seepage salamanders are associated with moist hardwood leaf beds near springs, seeps, or streams. Riparian and streamside management zone guidelines will protect this species from any direct impacts by drum chopping or fire line construction (Wilson 1995). Additionally, these moist areas along streams normally do not burn hot enough to consume the duff on the forest floor. Moist duff should protect seepage salamanders from direct mortality caused by fire. Both of these species would be able to escape fire by moving into streams or rock crevices.

Site preparation prescribed burns near known bat hibernacula could result in direct negative effects to endangered bats (direct mortality during hibernation). Refer to the Biological Assessment in the Appendix for additional information. A buffer zone of undisturbed vegetation will be maintained around known bat caves as described in the Biological Opinion or the Land and Resource Management Plan. Early successional habitat resulting from site preparation and restoration is a beneficial indirect effect for endangered bats. Indiana and Gray bats utilize open areas to forage on insects.

Any direct effects to avian species (game, high interest, ecological indicator species and management indicator species) would be the result of site preparation activities. Drum chopping and site preparation burns conducted during the nesting season may have a direct negative impact on the Eastern wild turkey, Northern bobwhite quail, prairie warbler and yellow-breasted chat, as these species nest on the ground or low in vegetation, respectively. These activities could destroy nests or hatchlings. (Dickson 1992, Hamel 1992)

An indirect effect will be the establishment of early successional habitat and associated benefits to wildlife. These beneficial effects would last for three to five years. Providing early successional habitat would benefit yellow-breasted chat, prairie warbler, Northern bobwhite, Eastern wild turkey, and White-tailed deer. Site preparation would also provide for establishment of the bluestem grasses and milkweeds. Early successional habitat produces numerous species of insects, a requirement of turkey brood rearing habitat and yellow-breasted chat and prairie warbler foraging areas. Early successional habitat is a requirement for quail and turkey nesting. Nesting of prairie warblers and yellow-breasted chats may also be benefited, as these species nest low in vegetation (Dickson 1992, Hamel 1992). Deer forage (browse) would be stimulated by site preparation and increased cover would be available.

Landbird monitoring through point count surveys on the Bankhead has shown that species associated with early successional habitats are generally absent or uncommon in stands older than ten years. This monitoring has revealed that prairie warbler, yellow-breasted chat, indigo bunting, and field sparrow are among the most common birds in stands between zero and ten years old (Stone 2000). Bug spot restoration would indirectly benefit these species for at least a period of five years, but possibly ten.

3.5.4 Cumulative Effects (Wildlife)

Cumulative effects analysis involves the prediction of effects arising from multiple interacting sources over relatively long periods of time. In the case of the forest health and restoration project, many individual forest management practices are planned that have effects individually and collectively upon the wildlife habitat of the area. The long-term future conditions of the forest will result in a quality habitat that provides the basic resources for wildlife to survive. Animals require food, cover, and water to sustain the physiological functions necessary to survive grow and reproduce (Stone 2000).

The Desired Future Conditions (DFC's) have been developed and are described in detail within chapter 2 and the appendix. Many of the management actions within the DFC's are based upon correcting or recovering from past actions such as the southern pine beetle treatment sites and the overstocked loblolly pine stands. These DFC's were also prepared with the intent to develop, preserve and retain areas of important wildlife habitat. The practices of thinning, restoration to shortleaf pine, longleaf pine and hardwoods, along with future management actions of prescribed burning will facilitate development of quality wildlife habitat in the future. The DFC's will provide a diversity of forest habitats that are not currently found on private lands. Bankhead National Forest is a relatively contiguous forest habitat of 350,000 acres. It has been described as an island of mature forest surrounded by small private non-industrial landowners and intensively managed timber industry lands (Stone 2000).

Surrounding private and corporately held lands are prevalently managed in a manner that limits the impact from southern pine beetle. Smaller ownerships are able to efficiently locate and treat outbreaks of the insect as well as to thin stands of pines when needed. There is a direct economic impact to these landowners if they fail to treat either problem in a timely manner. The Alabama Forestry Commission routinely conducts aerial observations for the purpose of notification of landowners and limiting damage from the beetle. Private lands adjacent to the national forest are typically managed with priorities of economics and timber production. Short rotations and shorter planning horizons are the rule. Management concerns for wildlife are typically limited to those of game species. This places increased emphasis on the forest communities with regard to the associated wildlife species that utilize these habitats. This issue is approached with private landowners through the Tree Farm and the TREASURE Forest program, in which landowners are encouraged to manage for multiple uses.

Increasing development pressure from larger metropolitan areas, such as Huntsville and Birmingham has pushed the demand for residential land to the edges of the national forest. Many areas of Lawrence and Winston counties are undergoing increased development for rural home sites. The area around Lewis Smith Lake is one such area with multiple acreage lots selling for millions of dollars. These areas are almost immediately cleared for construction and development of lawns. Many of these areas are located in streamside or lakeside areas. Resource friendly development has not yet been introduced in this area. This issue has been discussed with Alabama Power Company in a current re-licensing proposal.

Each area that is being considered within this project will be planned and managed to achieve a DFC. Information about wildlife communities suggests the impacts can be expected to occur if management affects the structure of vegetation (Short et al. 1982). Any management activity that alters the structure and composition of forest vegetation vitally alters wildlife habitats (Hamel 1992). Although there will be a range of habitat conditions at any given point in time, in the future the area will be managed consistent with the goal to maintain those desired conditions. This will insure that the habitats of that particular DFC are sustained.

Many wildlife species, in particular birds, are adapted to certain successional conditions and/or certain forest vegetation types. The forest provides birds with food to eat and appropriate cover to successfully mate, nest and raise their young. Bird species are adapted to conduct their life functions within a certain successional condition or vegetation type is the basic assumption of "community associates or habitat associations." It has been assumed that the knowledge of these habitat associations could be successfully used to predict the consequences of land management activities due to changes in the forest stand (Hamel 1996). In other words, within those habitats where favorable conditions are present, the birds will be present. Forest successional stages are the determining factor for presence, distribution, and abundance of a wide variety of wildlife species (DEIS for the Revised Land and Resource Plan, NF's in AL 2003).

This community (habitat association) approach to analyzing habitat availability and effects of management practices has been utilized by the Forest Service, Fish and Wildlife Service and other conservation organizations (Hamel 1992, Short 1982). An assumption of this approach is that the DFC provides suitable to optimal habitat for the species, thus all basic life cycle requirements are met. The DFC's are consistent with comprehensive planning documents by the Forest Service and other non-governmental organizations. Some of these include the Forest Service's Southern Appalachian Assessment, the Southern National Forest's Migratory and Resident Landbird Conservation Strategy, National Forests in Alabama's Draft Land and Resource Management Plan, Partners in Flight's Bird Conservation Plans, the North American Bird Conservation Initiative and The Nature Conservancy's Conservation Ranking System and Vegetation Classification System.

The coarse and fine filtration analysis process described previously is employed here to assess the cumulative effects of each alternative. The cumulative effects on the groups of species considered here would be directly attributable to the amount and arrangement of habitat types provided across the landscape. Habitat availability will determine species presence or absence. Refer back to 3.5.2.A, B, C, D and to the tables in the following pages to review the habitat associations identified for terrestrial wildlife and plant species on the Bankhead. Refer back to Table 3.5.2.E (Crosswalk) to review the relationship between species habitat associations and the DFC's. Additional information and evaluation of Threatened, Endangered, Sensitive, and Locally Rare species may be found in the Biological Assessment and Biological Evaluation in the appendix.

Using the acreages proposed in section 3.2 and using the crosswalk found in table 3.5.2.E, the following bar graphs were created to demonstrate the proposed acreages of each primary habitat association by alternative.

Area Sensitive Mid- to Late-Successional Deciduous Forest Habitat Association

(Mitchell 1999)

This habitat association includes bird species requiring mid- to late-successional or older deciduous forests. *Area sensitivity* refers to the concept that successful breeding is not likely to occur in small patches of otherwise suitable habitat. Most birds included in this association are neotropical migrants that primarily nest and raise young in the temperate Americas, while some are permanent residents. All species included in this association require continuous forested tracts ranging from 2 to 4,325 acres in size (Hamel 1992). Many avoid edges during nesting and are adapted to forest interior conditions.

Many species within this group are distributed over a wide range of microhabitats, although key areas are older forests such as mixed mesophytic hardwoods, oak, mixed pine hardwood and bottomland forests. A key attribute in measuring the quality of forest interior habitat is the proportion of edge. Habitat edges fragment optimal or suitable forest interior habitat, and are associated with microclimatic changes in light, temperature, wind, incidence of human influences including fire, increased predation and nest parasitism, and increased competition from exotic and pest species (Primack 1993; Yahner 1998).

Ambient moisture is also an important feature influencing the abundance and distribution of many of these species, including the Cerulean, yellow-throated, hooded, and worm-eating warblers (Martin et al. 1993; Hamel 1992). These birds are often distributed more evenly across mixed mesophytic landscapes, but are more restricted to moist patches in drier landscape settings. This may have implications for maintaining contiguous patches of potentially moist forest conditions (northern hardwood forest, mixed mesophytic forest, upland mesic forest, hardwood wetland forest, dry-mesic oak forest) and regulating activities that interrupt this continuum.

Common Name	Scientific Name	Status
Wood Thrush	*Hylocichla mustelina*	MIS/HI
Cerulean Warbler	*Dendroica cerulea*	HI
Hooded Warbler	*Wilsonia citrina*	MIS/HI
Yellow-throated Warbler	*Dendroica dominica*	HI
Worm-eating Warbler	*Helmitheros vermivorus*	HI
Scarlet Tanager	*Piranga olivacea*	MIS/EI
Swainson's Warbler	*Limnothlypis swainsonii*	MIS/EI
Pileated Woodpecker	*Dryocopus pileatus*	MIS/EI

MIS= Management Indicator Species

HI= High Interest Species

EI= Ecological Indicator Species

Table 3.5.2.F - List of Species Associated with Area Sensitive Mid- to Late-Deciduous Forest Habitat

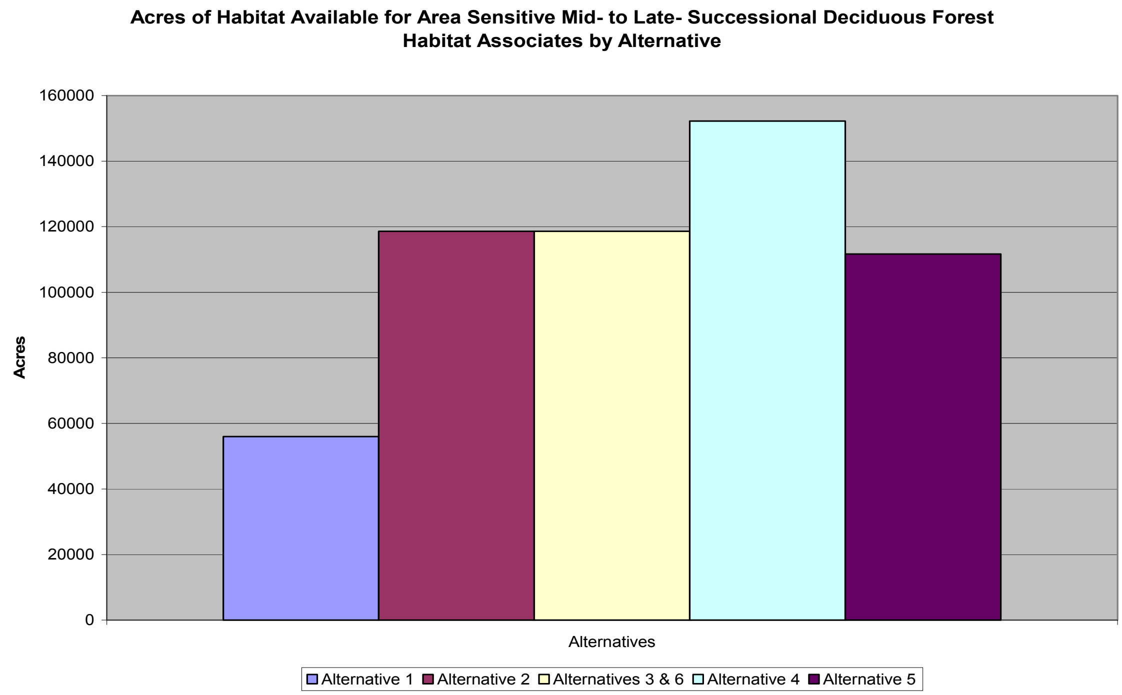


Chart 3.5.2.A - Acres of Area Sensitive Mid- to Late- Deciduous Forest Habitat

Mid- to Late-Successional Deciduous Forest Habitat Association

(McDonald 2000)

This habitat association emphasizes forest age and structure and to a lesser degree a particular forest type. It covers a broad range of deciduous forest types. These forest types are grouped into several forest vegetation classes including: Mixed Mesophytic Hardwood Forests, Oak Forests, Bottomland Hardwood Forests, White Pine Hemlock Hardwood Forests and Mixed Pine Hardwood Forest.

Forest Class	Mid-Successional	Late-Successional
Mixed Mesophytic Hardwood Forests	41-80 Years	81+ years
Oak Forests	41-80 Years	81+ years
Bottomland Hardwood Forests	21-60 Years	61+ years
White Pine-Hemlock-Hardwood Forests	31-90 Years	91+ years
Mixed Pine Hardwood Forests	41-80 Years	81+ years

Table 3.5.2.G - Forest Age and Structure of Mid- to Late- Successional Deciduous Forest

Mid-seral (successional) stage: The period during the development of a forest when a distinct overstory, midstory and understory canopy is present (i.e. vertical stratification). More sunlight becomes available to the midstory and understory. The age of the trees ranges from around 20 years to 90 years depending on the composition of tree species. The trees are usually greater than 10 inches d.b.h. These stages provide capability for hard mast production, larger standing snags, and live cavity trees. During this period, tree species within these forests reach economic maturity (Southern Appalachian Assessment Terrestrial Technical Report 1996).

Late-seral (successional) stage: The age of trees is usually greater than 80 years depending on tree species composition. Distinct overstory, midstory, and understory canopies continue to be present. In addition, small gaps become more common as some tree species die (i.e., an increase in horizontal stratification) allowing full sunlight to reach the understory and midstory in those gaps. These stages contain the largest trees within the forest and provide the highest capability for large snag production, and large live cavity and den tree production. The presence of large, down woody debris is highest during this period. Sometime during this period, trees within these forests reach biological maturity (Southern Appalachian Assessment Terrestrial Technical Report 1996).

National Forests and National Parks contain the largest portion of forests, however the majority of the acreage occurs on private land. Mid- to late-successional deciduous forests are primary providers of hardwood mast for dependent wildlife species.

Species Associated with Mid- to Late-Successional Deciduous Forest Habitats (10)

Common Name	Scientific Name	Status
Gray Squirrel	*Sciurus carolinensis*	GS
Fox Squirrel	*Sciurus niger*	GS
Eastern Wood-Pewee	*Contopus virens*	HI
Whip-poor-will	*Caprimulgus vociferus*	HI
Chuck-wills-widows	*Caprimulgus carolinensis*	HI
Rafinesque's Big-eared Bat	*Corynorhinus rafinesquii*	S
Large whorled pogonia	*Isotria verticillata*	LR

MIS= Management Indicator Species

HI= High Interest Species

EI= Ecological Indicator Species

GS= Major Game Species

S= Sensitive Species

LR= Locally Rare Species

Table 3.5.2.H - List of Species Associated with Mid- to Late- Succesional Deciduous Forest

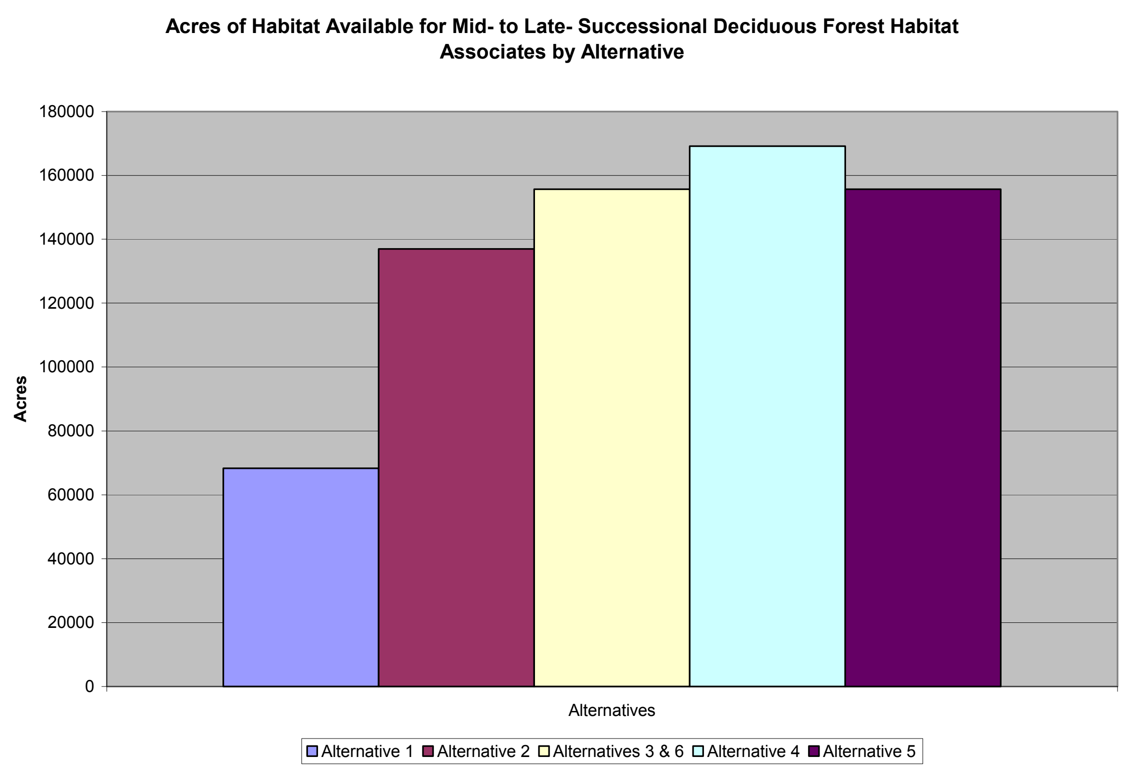


Chart 3.5.2.B - Acres of Mid- to Late- Deciduous Forest Habitat

Shrub/Seedling/Sapling Habitat Association

(Peters 1999)

Shrub/seedling/sapling habitats are a successional stage in other habitat associations, occur in several other habitat associations, and are components of some rare communities. Suitable to optimal habitat for shrub/seedling/sapling habitat associates is characterized by high stem densities of persistent woody vegetation and thick foliage. Examples include briar patches, regeneration areas (including southern pine beetle spots), laurel thickets, and vine tangles. Whether these sites are small sites within a larger area or an extensive area by themselves, shrub/seedling/sapling habitats provide an abundance of nesting sites for birds, small mammals, reptiles and amphibians. These habitats provide food in the form of browse, leaves, fruits and seeds for various terrestrial wildlife species. Shrub/seedling/sapling habitats also have the potential to produce large numbers of insects to the combination of thick growth and standing dead and decaying material. The ground surface in these habitats is cooler, moist and usually covered with leaf litter. Only shade loving plants thrive under the near complete multi-layer canopy of most shrub/seedling/sapling habitats.

There are four generalized types of shrub/seedling/sapling habitats that may be found on the Bankhead: thickets, reverting fields, regeneration areas and vines. The quality and longevity of these habitats is determined primarily by site conditions but is heavily influenced by past land use, recent management activities or disturbance. Management of these habitats to maintain shrub/seedling/sapling characteristics requires periodic treatments to reduce competition from tree species and create growing space for shrubby species.

Species Associated with Shrub/Seedling/Sapling Habitats (20)

Common Name	Scientific Name	Status
Blue-winged Warbler	*Vermivora pinus*	HI
Prairie Warbler	*Dendroica discolor*	MIS/HI
Yellow-breasted Chat	*Icteria virens*	MIS/EI

HI= High Interest Species

MIS= Management Indicator Species

EI= Ecological Indicator Species

Table 3.5.2. I - List of Species Associate with Schrub/Seedling/Sapling Habitat

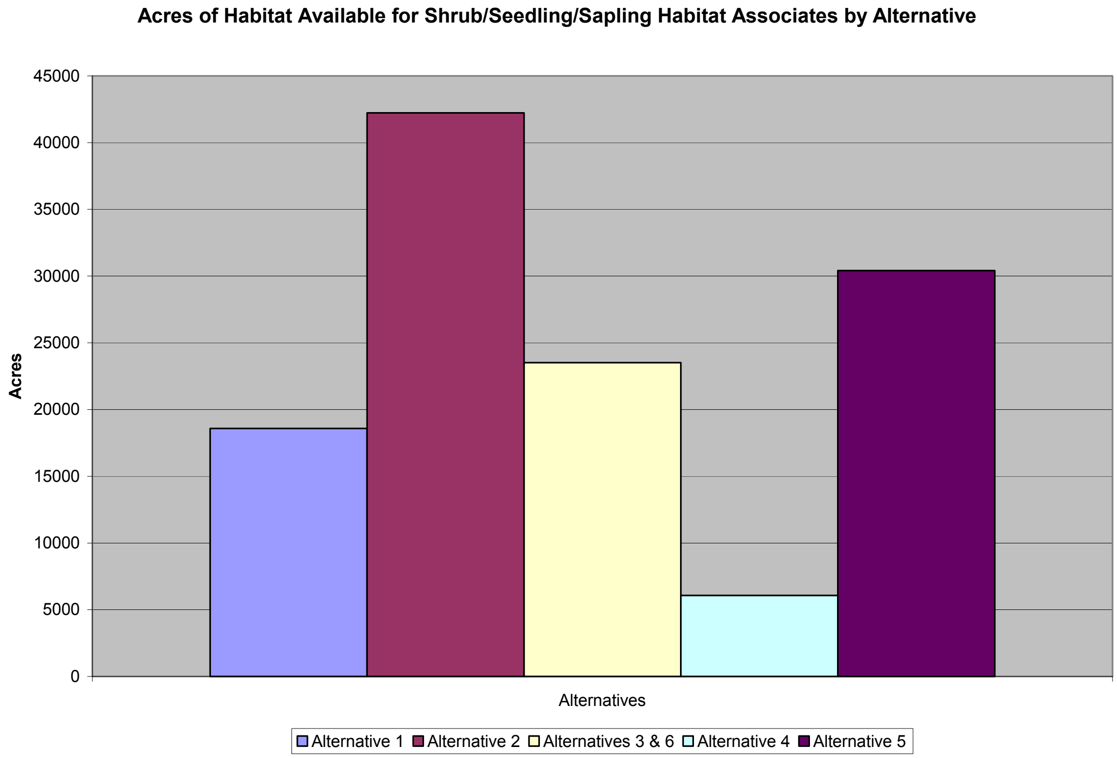


Chart 3.5.2.C - Acres of Schrub/Seedling/Sapling Habitat

Mixed Xeric Forest Habitat Association

(Wentworth 2000)

Suitable to optimal habitat for species found in this group is described primarily as xeric oak, xeric mixed pine-hardwood and southern yellow pine forests. Xeric oak forests occur on south and west facing slopes and on broad and narrow convex landforms, over a broad range of elevations. Xeric oak forests are dominated by oaks. Southern yellow pine forests occur on all topographic positions at low to intermediate elevations. Canopies are dominated by loblolly, shortleaf, longleaf, and Virginia pines. Xeric mixed pine-hardwood forests form the transition between xeric oak and southern yellow pine forests. Xeric mixed pine-hardwood forests are found at low to intermediate elevations, on both broadly and sharply convex landforms, usually with a south or west exposure. Canopies are dominated by a mixture of oak and pine. Xeric mixed pine-hardwood forests most likely resulted from disturbances. Periodic fires on the landscape level are important for maintaining suitable to optimal habitat conditions for species associated with the mixed xeric forest. The mixed xeric forest significantly contributes to the amount of hard and soft mast available to terrestrial wildlife species.

Species Associated with Mixed Xeric Forest Habitats (19)

Common Name	Scientific Name	Status
Wherry's Catchfly	*Silene caroliniana spp wherryi*	LR
Small-head gayfeather	*Liatris microcephala*	LR
Nestronia	*Nestronia umbellula*	LR

LR= Locally Rare Species

Table 3.5.2.J - List of Species Associated with Mixed Xeric Forest Habitat

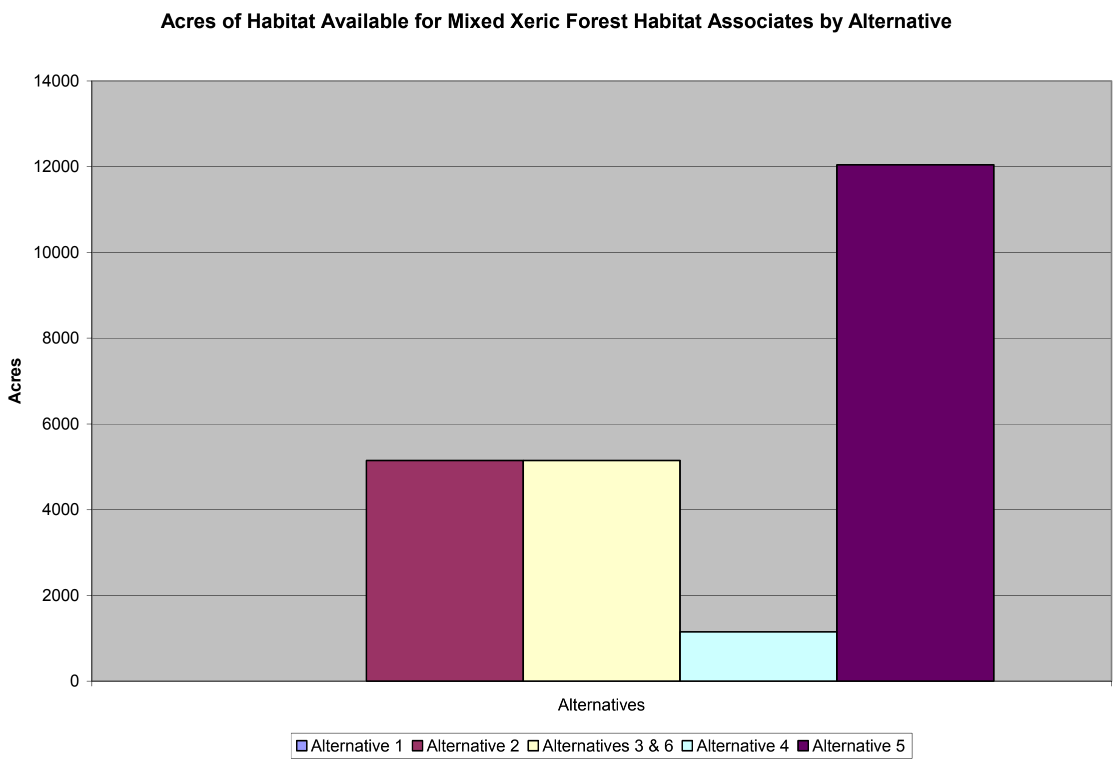


Chart 3.5.2.D - Acres of Mixed Xeric Forest Habitat

Mixed Mesic Forest Habitat Association

(Roecker and Wentworth)

Suitable to optimal habitat for mixed mesic forest associates is described here. Species included are primarily associated with moist, well-drained sites that occur on north-facing slopes, steep slopes, lower slopes, slopes next to creeks and rivers, coves, or higher elevations. Common communities or vegetation types include northern hardwoods, mixed mesophytic forests, mesic oak and mesic oak-pine forests, mesic mixed hardwood forests, and cove forests.

Species Associated with Mixed Mesic Forest Habitats (18)

Common Name	Scientific Name	Status
Small flowered buckeye	*Aesculus parviflora*	S
Lanceleaf Trillium	*Trillium lancifolium*	S
Jeweled Trillium	*Trillium simile*	S
Butternut	*Juglans cinerea*	S
Bryson's sedge	*Carex brysonii*	S
Yellow Trout Lily	*Erythronium umbilicatum ssp umb.*	LR
Yellow lady's slippers	*Cypripedium pubescens*	LR
White Trout Lily	*Erythronium albidum*	LR
Wahoo	*Euonymus atropurpurea*	LR
Twinleaf	*Jeffersonia diphylla*	LR
Toadshade Trillium	*Trillium sessile*	LR
Silky Camellia	*Stewartia malacodendron*	LR
Puttyroot	*Aplectrum hyemale*	LR
Prairie Trillium	*Trillium recurvatum*	LR
Pinesap	*Monotropa hypopithys*	LR
Little-leaved alumroot	*Huechera parviflora var puberula*	LR
Goldie's fern	*Dryopteris goldiana*	LR
Goldenseal	*Hydrastis canadensis*	LR
Ginseng	*Panax quinquefolia*	LR
Dutchman's breeches	*Dicentra cucullaria*	LR
Diana Fritillary	*Speyeria diana*	LR
Columbo	*Swertia caroliniensis*	LR
Blue ridge trillium	*Trillium stamineum*	LR
Bent Trillium	*Trillium flexipes*	LR
Allegheny Spurge	*Pachysandra procumbens*	LR

S= Sensitive
LR= Locally Rare

Table 3.5.2.K - List of Species Associated with Mixed Mesic Forest Habitat

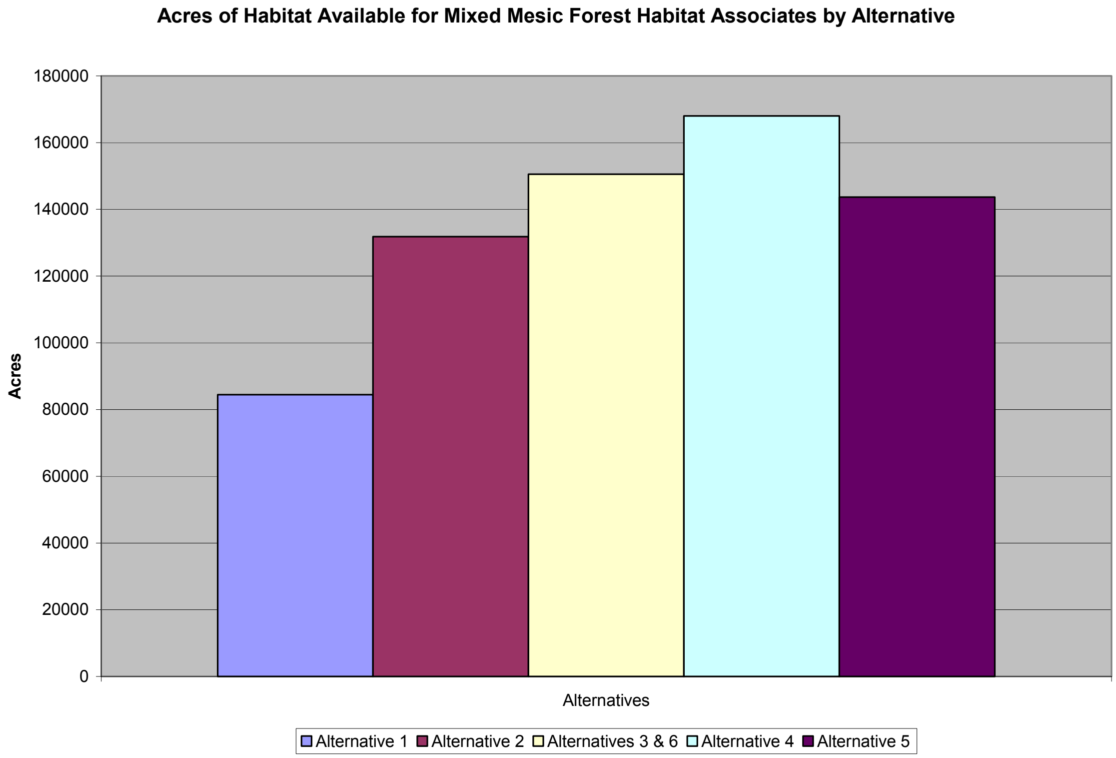


Chart 3.5.2.E - Acres of Mixed Mesic Forest Habitat

Southern Yellow Pine Forest and Woodland Habitat Association

(McDonald 2000)

The Southern Yellow Pine Association occurs throughout the Southern Appalachians, but is more common in the piedmont and mountain-piedmont transition zone. The species composition varies but is typically represented by Loblolly and Shortleaf pine. Past land use was dominated by agricultural activities, which is an important factor in determining the species composition including Virginia, Shortleaf and Loblolly pine. Loblolly Pine was extensively planted in the Southern Appalachians. This habitat association occurs at low to intermediate elevations. The species associations vary depending on climate, range, land use and topographic features. Some typical Southern Yellow Pine associates on well drained soils include Southern red oak, white oak, blackjack oak, sassafras and persimmon. Southern pine associates found on moderate to poorly drained soils include: sweetgum, black gum, red maple, water oak, willow oak and cherrybark oak. In fertile well-drained coves along stream bottoms the Southern pine associates may include yellow poplar, American beech, and ash often with a Loblolly-Shortleaf Pine cover type. Southern Yellow Pine Associates found on wet sites may include: sweetbay, southern magnolia, redbay, swamp tupelo, red maple, sweetgum, water oak, cherrybark oak, swamp chestnut oak, white ash, American elm and water hickory. Several understory species that are found typically associated with Southern Yellow Pines include flowering dogwood, American holly, inkberry, yaupon, hawthorne, southern bayberry, pepperbush, sumac and several ericaceous shrubs. Herbaceous species include bluestem, panicum, sedges, and fennels. This above listing of Southern Yellow pine associates is by no means all inclusive, however these are some typical representatives (Silvics of North America Vol 1 1990).

The geographic range of the southern yellow pine species that comprise these types is varied, yet they share a similar climate. Singly, or in combination, their range extends from the Barrens of New Jersey southward through the mountains of Virginia, West Virginia, Kentucky, Tennessee, and the Carolinas through the foothills, Piedmont, and Coastal Plains to the flatwoods and sandhills of Florida; westward across the Gulf Coastal Plains into eastern Texas and Oklahoma; northward to the Plateau and highland Rim of Tennessee; and into the Ozarks of Arkansas and Missouri. Botanically, their ranges overlap in the South. Some frequently occur in mixed stands, yet each species is adapted to a slightly different environment where it may grow almost exclusively.

At one time the longleaf pine forest may have occupied as much as 24 million ha (60 million acres) of its range, although by 1985 less than 1.6 million ha (4 million acres) remained. Longleaf pine develops in close association with periodic surface fires. The vegetation associated with longleaf pine reflects the frequency and severity of burning. In the past, frequent fires resulted in open, park like stands of longleaf with few other woody plants and a ground cover dominated by grasses. Ground cover in longleaf pine in the Coastal Plains can be separated into two general regions, with the division in the central part of south Alabama and northwest Florida. To the west, bluestem (Andropogon spp.) and panicum (Panicum spp.) grasses predominate; to the east, wiregrass (pineland three awn, Aristida stricta) is most common. With a reduction in fire occurrence, hardwoods and other pines encroach on the longleaf forest.

Species Associated with Southern Yellow Pine Forests and Woodland Habitats (17)

Common Name	Scientific Name	Status
Brown-headed nuthatch	*Sitta pusilla*	MIS/HI
Pine Warbler	*Dendroica pinus*	MIS/EI
Red Cockaded Woodpecker	*Piciodes borealis*	E
Clammy Locust	*Robina viscosa*	S

MIS= Management Indicator Species
HI= High Interest Species
EI= Ecological Indicator Species
E= Endangered Species
S= Sensitive Species

Table 3.5.2.L - List of Species Associated with Southern Yellow Pine Forests and Woodland Habitats

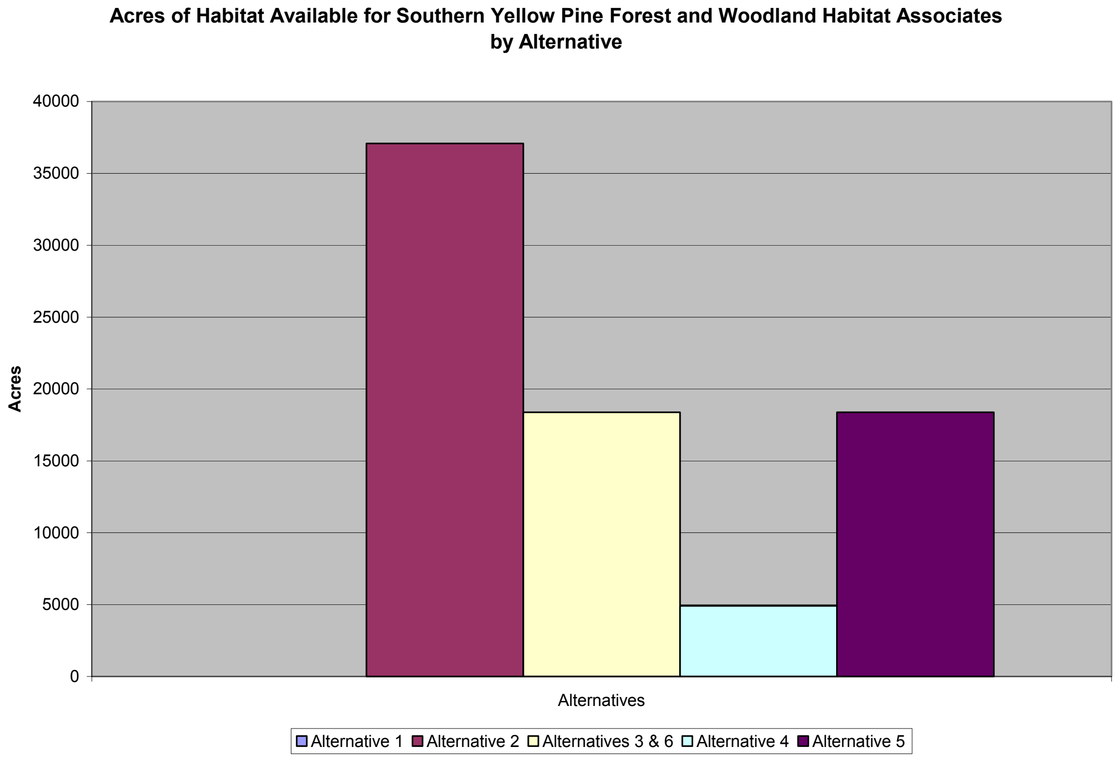


Chart 3.5.2.F - Acres of Southern Yellow Pine Forests and Woodland Habitats

Glades, Prairies and Woodland Habitat Association

(Roecker)

Grass-dominated "barrens", glades, prairies, and woodlands were once a frequent occurrence across the southeastern landscape (DeSelm & Murdock 1993), particularly in the Interior Plateau and Ridge and Valley of Tennessee, Kentucky, Virginia, northern Alabama and northern Georgia (Baskin et.al. 1994). Communities associated with longleaf pine ecosystems and high elevation balds will be addressed in another habitat association. Maintained by lightning, Native American burning, or extreme edaphic conditions, today communities included within this habitat association are mostly considered rare, especially those associated with mafic, ultramafic, or calcareous rocks. In some cases, rare, threatened, or endangered species may serve as indicators of a previous disturbance regime dominated by frequent (every 1-3 years) to occasional (every 5-10 years) fire. Glades are naturally treeless areas with mafic, ultramafic, or calcareous rocks such as limestone or dolomite (Baskin & Baskin 1986), diabase, gabbro, serpentine, or dunite (Schafale & Weakley 1990) at or near the soil surface. Plant communities are dominated by herbaceous species, but may consist of a mosaic of stunted trees such as eastern red cedar, pitch pine, or post oak, with winter or summer annuals, perennial forbs, shrubs, grasses, mosses and lichens. The cedar glades of Tennessee, Kentucky, northern Alabama, and northern Georgia can occur on very thin soil ranging from nothing on exposed rock to about 20cm deep, and the climate is wet in winter and early spring and dry in summer.

Southeastern prairies are open grass-dominated areas similar in structure and composition to tall grass prairies of the midwest, or simply a treeless area or barren. The term "barren" was often used to describe treeless areas historically, and may still be used to refer to communities which occur over limestone (Central Basin of Tennessee and Alabama, Interior Low Plateau of Kentucky, Highland Rim of Tennessee), sandstone (Appalachian Plateau of Kentucky and Tennessee), or may not be tied to any particular soil type but which without fire, will become fairly dense with shrub and tree growth (Baskin et.al. 1994). At least two types of prairies are known to occur throughout the southeast, one limited in distribution occurring on specific soil and geologic types, and one much more widespread and prevalent throughout the piedmont. Although limestone and diabase prairies are known to exist, prairie-like species are also known to occur on open areas not tied to a particular soil type, such as along roadsides and powerline rights-of-way (though these are probably remnants of a once larger prairie). In a compilation of grass species found in prairies throughout Texas, Arkansas, Kentucky, Tennessee, Georgia, and Alabama, little bluestem (*Schizachyrium scoparium*), indiangrass (*Sorghastrum nutans*), and big bluestem (*Andropogon gerardii*) were consistently encountered (DeSelm and Murdock 1993). These species were all part of more widespread prairie created and maintained by the practice of annual, dormant season burning by native Americans which created isolated grasslands where forest otherwise would have prevailed (Frost 1998).

According to the International Classification of Ecological Communities (Weakley et.al 1998), woodlands are open stands of trees with crowns usually not touching (forming 25-60% cover). Grasses, such as little bluestem, or heaths, such as huckleberries and blueberries, may be commonly found in the understory. Within the analysis area, woodlands may occur as fire-suppressed glades and prairies, on xeric ridgetops and south-facing slopes co-dominated by shortleaf pine and oak. Many woodlands require fire for long-term persistence, and are thought to have been much more common in the pre-settlement landscape (Cowell,1998).

Several communities included within this association are considered globally rare (Weakley et.al. 1998). Baskin & Baskin (1996) identified 29 species endemic or nearly-endemic to cedar glades. The Southern Appalachian Assessment (1996) showed that only 25% of all known occurrences for species associated with mafic and other calcareous habitats, occurred on national forest lands. These species, probably associated with a more widespread prairie type, have been less well documented than calciphiles. Roadsides and utility corridors have often not been the focus of botanical exploration, and are particularly vulnerable habitats as well often seeded with exotic species, and subject to herbicide spraying, road undercutting, and encroachment from successional vegetation.

Open conditions in glades, prairies, and woodlands, may be drought or edaphically controlled on shallow soils, but otherwise rely upon grazing, burning, mowing or bush-hogging to control woody species competition with the herbaceous plants. The ecological role of prescribed fire is well documented in the literature, though the optimal frequency and intensity of fire to restore and then maintain the desired condition will be a site-specific decision followed by careful monitoring. Fire plans which mimic the original nautral fire regime will maintain or enhance the native biodiversity of a given community type (Frost et.al. 1986). Fire frequency (related to desired vegetation structure and soil depth), season of burn, and fire intensity (related to fuel loading and moisture content) should be considered. Once hardwoods have overtaken a site, a series of hot, summer burns may initially be required and/or woody species removal through thinning or mid-story control efforts.

A database of glades is not currently maintained on the Bankhead. All sites planned for treatment in this project were planned to be evaluated as a part of this analysis. Glades will be protected during project implementation. Therefore, there will not be a difference in acreages of glade habitat among any of the alternatives. Although, there will be a difference in acreages of available habitat for these species associates among alternatives due to the varying amounts of woodland acres. This difference is represented in the graph below.

Species Associated with Glades, Prairies, and Woodland Habitats (6)

Common Name	Scientific Name	Status
Little bluestem	*Schizachyrium scoparium*	MIS/EI
Broomsedge bluestem	*Andropogon tenarius*	MIS/EI
Virginia bluestem	*A. virginicus*	MIS/EI
Milkweeds	*Asclepias spp.*	MIS/EI
Leafy Prairie Clover	*Dalea foliosa*	E
Lyrate Bladderpod	*Lesquerella lyrata*	T
Tennessee Milkvetch	*Astragalus tennesseensis*	S
Limestone Fameflower	*Talinum calcaricum*	S
Alabama snow-wreath	*Neviusia alabamensis*	S
Menges Fameflower	*Talinum mengesii*	S
Fleshy-fruit gladecress	*Levenworthia crassia*	S
Alabama skullcap	*Scutellaria alabamensis*	S
Alabama larkspur	*Delphinium alabamican*	S
Alabama Gladecress	*Leavenworthia alabamica var. ala*	S
Duck River Bladderpod	*Lesquerella densipila*	S-H
Wild hyacinth	*Camassia scilloides*	LR
Three-corner prairie clover	*Dalea carnea var gracilis*	LR
Sunnybells	*Schoenolirion croceum*	LR
Royal Catchfly	*Silene regia*	LR
Gattinger's prairie clover	*Dalea gattingeri*	LR
Alabama Sandwort	*Minuartia*	LR
A prairie clover	*Dalea sp.*	LR

MIS= Management Indicator Species
EI= Ecological Indicator Species
E= Endangered Species
T= Threatened Species
S= Sensitive Species
LR= Locally Rare Species
H= Historical Range

Table 3.5.2.M - List of Species Associated with Glades, Prairies, and Woodland Habitats

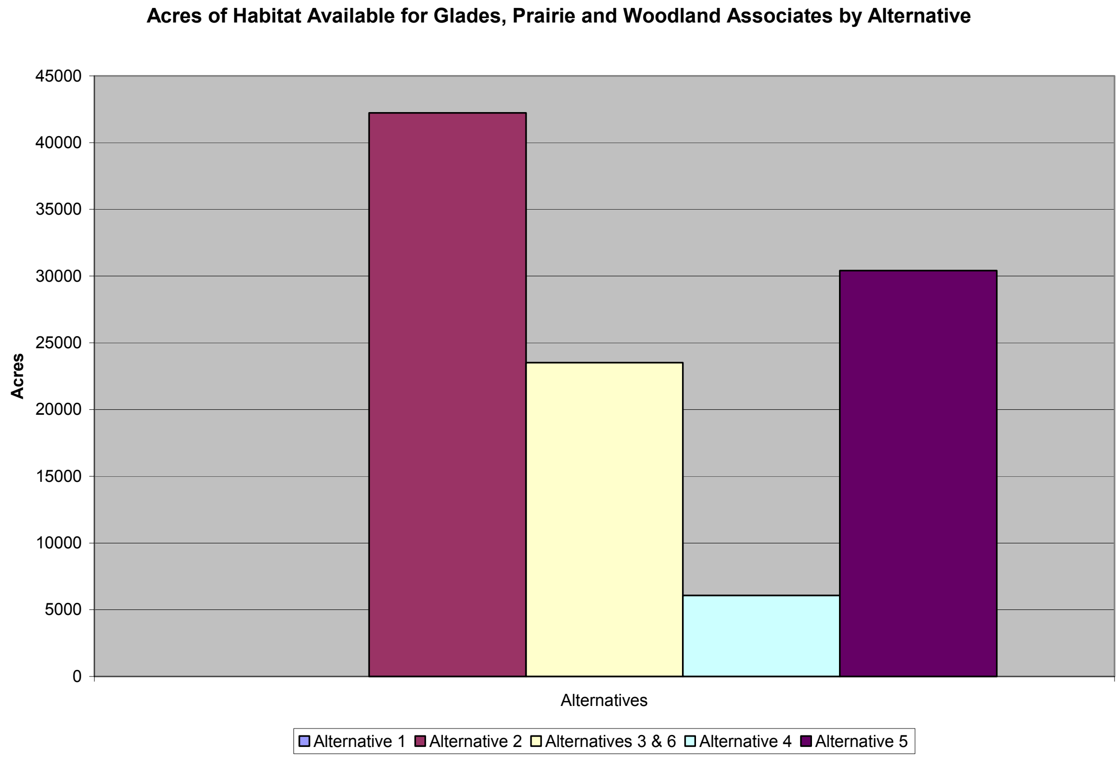


Chart 3.5.2.G - Acres of Glades, Prairies, and Woodland Habitats

Grass/Forb Habitat Association

(Peters 1998)

The mental image of grass/forb habitats is often a vision of open fields, a carpet of asters and goldenrods in the fall, mustard and wildflowers in the spring and, wild carrot and dog fennel in the summer. While that is certainly grass/forb habitat, quite often grass/forb habitats in the South occur in a grove of trees, open woodlands or under scattered trees with little to no midstory development. In virtually all cases grass/forb habitats are recognized by a well-developed herbaceous layer of annual and perennial grasses and herbs.

Characteristics of grass/forb habitats can be found in several other habitat associations and rare communities. In all but unique locations this habitat rapidly evolves into another habitat association, such as shrub/seedling/sapling, without periodic maintenance (mowing, disking, etc.) or disturbance by fire. Species composition and structure in grass/forb habitats vary widely due in part to environmental influences and site conditions but largely reflect recent cultural activities or disturbances. Different types of grass/forb habitats include natural openings, abandoned fields, open woodlands, and regeneration areas.

Natural openings including barrens, glades, and prairie remnants persist primarily as a result site condition influences. These sites provide a mixture of habitat conditions and support a wide variety of plant communities not often found elsewhere. By their nature, these areas do not readily support trees and shrubs. But, without periodic disturbances such as fire these habitats will slowly evolve into shrub/seedling/sapling stands and eventually lose their grass/forb character. The combination of low site productivity and the persistence of a wide variety of annual and perennial vascular plants, mosses and lichens make these areas unique in providing food and cover conditions for some insects, reptiles, birds and mammals during portions of the year. These areas have a higher incidence of persimmon, blueberry spp., crabapple, hawthorn and similar shrubby species than other types of grass/forb habitats. Tree species (if present) are stunted and sparse.

Abandoned fields are largely influenced by past cultural activities and may be dense sod or a rapidly changing field of annual and broadleaf plants, grasses, woody plants and tree seedlings. In any case, these sites are productive in terms of food and cover for a variety of animals. Although constantly changing this habitat type can persist for several years in providing some grass/forb habitat characteristics. Periodic maintenance is essential however to maintain grass/forb habitat conditions in perpetuity in reverting old fields.

Open woodlands are characterized by partial to complete ground cover of annual and perennial plants, few shrubs, scattered pole and sawtimber size trees and in most cases, a proliferation of newly germinated tree seedlings. More often than not this type of habitat is the result of a combination of periodic fire and partial overstory removal which maintains or mimics woodland or savannah like conditions. Bunch grasses, fire adapted plants (annual and perennial) and a wide variety of wind dispersed annuals thrive. As a result, a spectrum of habitat conditions are maintained or created due in part to the intensity and periodicity of fire and in part to the degree of canopy closure. In addition, the quality of habitat and therefore utilization by wildlife, is regulated by local site conditions (fertility, seed sources, etc.).

The last type of grass/forb habitat discussed here is a condition that results from some ground disturbing activity (land clearing, reclamation, and restoration) and/or the initiation of natural succession (timber harvesting). In these instances, grass/forb habitat conditions are created the first growing season following ground-disturbing activities and rapidly evolve in to shrub/seedling/sapling stands over the next 2-3 years. In predominantly forested areas these are the habitats that are in the shortest supply and exist for the shortest amount of time. Due to the rapid progression of natural succession, many species of wildlife that utilize these areas in large numbers in year one and two are uncommon visitors to absent at the same site in years four and five and beyond.

Species Associated with Grass/Forb Habitats (8)

Common Name	Scientific Name	Status
Eastern Cottontail	*Sylviagus floridanus*	GS
Northern Bobwhite	*Colinus virginianus*	MIS/GS
Bachman's Sparrow	*Aimophila aestivalis*	HI
Field Sparrow	*Spizella pusilla*	HI
Eggert's Sunflower	*Helianthus eggertii*	T
Alabama Grapefern	*Botrychium jenmanii*	LR-H

GS= Major Game Species
MIS= Management Indicator Species
HI= High Interest Species
T= Threatened Species
LR= Locally Rare Species
H= Historical Range

Table 3.5.2.N - List of Species Associated with Grass/Forb Habitat

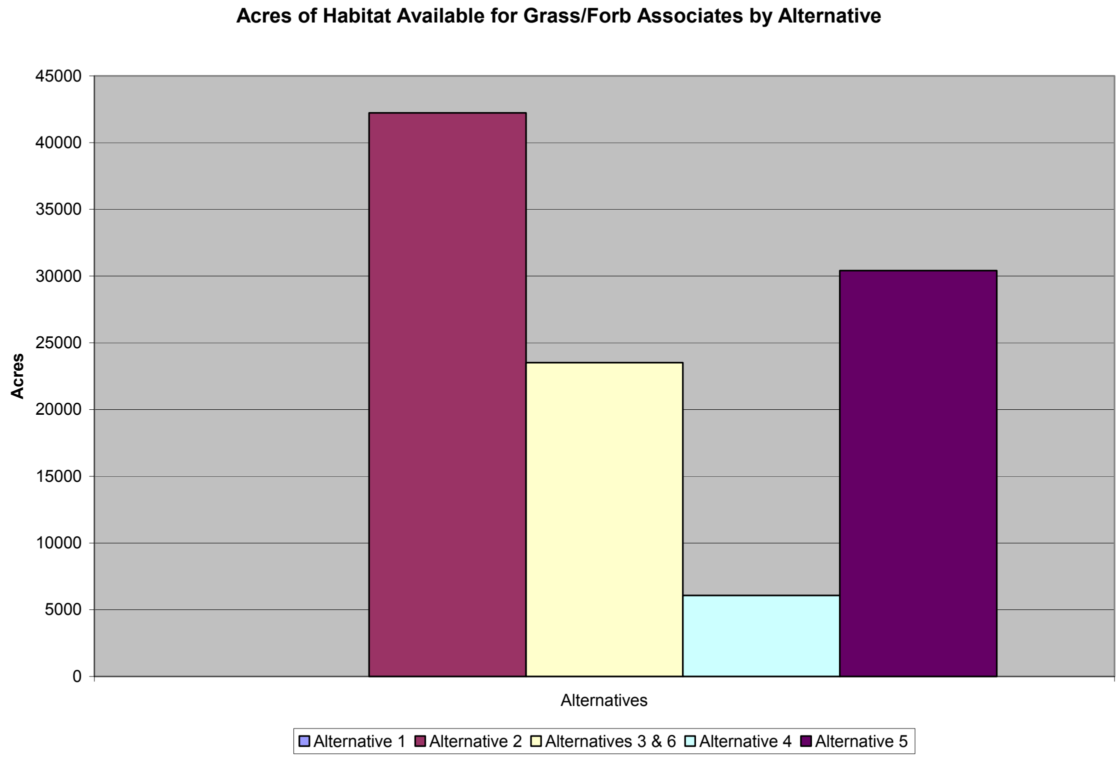


Chart 3.5.2.H - Ares of Grass/Forb Habitat

Cave Habitat Association

(Mitchell 1999)

In the Southern Appalachians, most caves are found in carbonate valleys of the Ridge and Valley province and the Cumberland Plateau. Because of their rarity and vulnerability, their protection is a key conservation need within this region. Cave communities are variable within and between occurrences, and physical attributes vary both spatially and temporally. The hydrology, configuration, size, shape and location of entrances, elevation, and patterns of air flow of caves influences the types of biological communities found within. Cave communities are uniquely influenced by lack of light, limited distribution of nutrients and energy, and an internal environment buffered in relation to the outside environment. Microhabitats include streams, pools, wet stone, mud flows, dry rock, and mud banks.

The geology and hydrology of these areas are complex, and human activities can have significant negative impacts on these sensitive systems. The surface of karstlands is directly connected to caves and aquifers in an integrated system. Surface water percolates into the ground and moves to underground streams. Because of this, karstlands are particularly sensitive to degradation. Stresses in this type of terrain can result in environmental problems for biological communities (including humans) that are much more acute than those of other areas.

Some bats are dependent on caves, both seasonally and year-round. Detailed information on Indiana and Gray bats can be found in the Biological Assessment contained in the appendix.

Caves will not be impacted by this project; therefore, a comparison of alternatives graph was omitted here. A database of cave locations is maintained at the District office.

Species Associated with Cave Habitats (1)

Common Name	Scientific Name	Status
Indiana bat	*Myotis sodalis*	E
Gray bat	*Myotis grisescens*	E

E= Endangered Species

Table 3.5.2.O - List of Species Associated with Cave Habitats

Wetland (Bog) Habitat Association

(Wentworth 2000)

It is estimated that greater than 50% of the nation's wetlands have been destroyed in the past 200 years (Ernst and Brown 1988). Bogs have been ditched and drained for pastures and for certain logging operations (Wharton 1978), mined for peat (Ewel 1990), and filled-in for shopping centers. Sedimentation, pollution, and plant succession have also contributed to loss and/or degradation of bog habitat (USFWS 1991). Linked to plant succession, is the history of fire suppression in those systems dependent on fire to maintain their bog conditions. Depending on the type of bog, most need managing to maintain their open character.

Bogs provide habitat for many species of reptiles and amphibians. Wilson (1995) lists 37 species of reptiles and amphibians associated with Carolina bays, pocosins, and bogs in the South, and 41 associated with swamp habitat. Several species require these habitats for breeding. The species dependent upon bogs on the Bankhead are plant species. A wetland database is not maintained on the District at this time. All sites planned for treatment were planned to be evaluated as a part of this analysis. Wetlands will be protected during project implementation. Therefore, there will not be a difference in available acreages to bog habitat associates among any of the alternatives.

Species Associated with Bog Habitats (2)

Common Name	Scientific Name	Status
Mohr’s Barbara’s Buttons	*Marshallia mohrii*	T
Yellow fringeless orchid	*Planthera integra*	S
White fringeless orchid	*Platanthera integrilabia*	S-C

T= Threatened Species

S= Sensitive Species

C= Candidate for Federal Listing

Table 3.5.2.P - List of Species Associated with Wetland (Bog) Habitats

Rock Outcrop and Cliff Habitat Association

(Mitchell and Wentworth 1999)

Rare communities included in this association are calcareous and sandstone cliffs. These habitats are considered to be terrestrial "islands" due to their scattered development, and are therefore very susceptible to degradation. Their isolation and small size make public ownership a difficult rangewide strategy for protection (Martin et al. 1993). Ecological processes in many of these habitats are characterized by chronic stress conditions related to temperature and moisture.

Calcareous cliffs are sparsely vegetated and characterized by significant areas of bare rock, usually limestone or sandstone, with open scattered vegetation. The cliffs generally occur above medium to large streams or rivers and result from river undercutting and meander formation. Some occurrences are more than 100 feet tall. They are typically xeric, but may contain seepage zones. Thin rocky soils accumulate in crevices, on ledges, and along rock margins. Occurrences on lower slopes are generally more sheltered, less steep, mesic, and accumulate more soil. Vegetation is sparse over patches of rock and becomes more dense in soil accumulations. Trees and shrubs may be present, but a closed canopy never develops. Dominant vegetation is moss, lichens, ferns and calciphilic herbs. Calcareous cliffs are distinguished from other cliffs by substrate type and floristics.

Sandstone cliffs are typically quartzitic sandstone escarpments occurring above streams and rivers in the Ridge and Valley and the Cumberland Plateau. They occur at all ridge and slope topographic positions and range from very exposed, xeric cliffs to more sheltered, mesic slope rockhouses. Soils are generally acidic and consist of organic pockets or coarse mineral matter which has accumulated within mats of pioneer vegetation, on ledges, and in crevices. Vegetation is typically sparse and consists of lichens and mosses over the vertical rock face, with grasses, sedges and other vascular plants in deeper soils of ledges, crevices or vegetation mats along the top of the outcrop.

All sites were planned to be evaluated as a part of this analysis. Rock outcrops and cliffs will be protected during project implementation. Therefore, there will not be a difference in available acreages to rock outcrop and cliff habitat associates among any of the alternatives.

Species Associated with Rock Outcrop and Cliff Habitats (7)

Common Name	Scientific Name	Status
Alabama streak-sorus fern	*Thelypteris pilosa var. alabamensis*	T
Spreading yellow false foxglove	*Aureolaria patula*	S
Scott's Spleenwort	*Asplenium x ebendoides*	S
Nevius' stonecrop	*Sedum nevii*	S
Menge's fameflower	*Talinum mengesii*	S
Little mountain meadow rue	*Thalictrum mirabile*	S
Gorge filmy fern	*Hymenophyllum tayloriae*	S
Blue Ridge catchfly	*Silene ovata*	S
Weft fern	*Trichomanes intricatum*	LR
Round leaved firepink	*Silene rotundifolia*	LR
Rock clubmoss	*Huperzia porophilla*	LR
Pinnate-lobed Black-eyed Susan	*Rudbeckia triloba var pinnatiloba*	LR
Green Salamander	*Aneides aeneus*	LR
Dwarf bristle fern	*Trichomanes petersii*	LR

T= Threatened Species
S= Sensitive Species
LR= Locally Rare Species

Table 3.5.2.Q - List of Species Associated with Rock Outcrop and Cliff Habitats

Forest Riparian Habitat Association

(Huber, Kirk, and Donahue 2001)

Forest riparian habitats are not proposed for treatment by any of the alternatives. Therefore, the acreages of available forest riparian habitat will not change as a result of this Forest Health and Restoration Initiative. All riparian areas will be protected through streamside management zone guidelines set forth in the Forest Plan.

The forest riparian habitat association encompasses the transitional area between aquatic systems and upland terrestrial systems. Wetlands as well as margins of varying width along streams, rivers, lakes, ponds, and reservoirs are included within this association. This association includes a mosaic of native communities and successional stages occurring along streams and rivers. Within the vegetation mosaic, old-growth conditions predominate with multiple canopy layers. Woody debris is abundant in the riparian area, streams, and adjacent uplands and includes branches, large logs, stumps, and root wads. Natural disturbances such as floods, channel meanders, and fires occur and proceed without intervention in most cases. Natural and human caused disturbances create early successional conditions and restore or maintain natural conditions.

Riparian corridors are standard width areas adjacent to water features that exhibit the full range of habitat functions necessary to support riparian-associated fish and wildlife. Riparian corridors include the concept of buffering streams to retain important stream functions, but they also encompass the functional aspects of riparian areas relative to uplands.

The retention and protection of riparian habitat has been shown to be important in supporting greater species diversity; retaining macroinvertebrate, small mammal and amphibian populations; moderating stream temperatures; improving infiltration and minimizing surface flows; reducing sediments and pollutants that reach water supplies; recruiting large downed logs into the stream and riparian habitat; providing large diameter snags for fish and wildlife use; providing breeding, feeding, and movement habitat for fish and wildlife; and providing critical refuge and continuous corridors in developed landscapes (Knutson and Naef 1997, Tiner 1999). Riparian habitat characteristics required by fish and wildlife include habitat connectivity; vegetation diversity, including age, species composition, and vegetation layer diversity; vegetation vigor, abundance of snags and woody debris; and a width that is adequate to retain riparian habitat functions (Knutson and Naef 1997).

Species Associated with Forest Riparian Habitats (11)

Common Name	Scientific Name	Status
Acadian Flycatcher	*Empidonax virescens*	MIS/EI
Louisiana Waterthrush	*Seiurus motacilla*	HI
Tennessee Yellow Eyed Grass	*Xyris tennesseensis*	E
Bald Eagle	*Heliaeetus leucocephaelus*	T
Riverbank bush-honeysuckle	*Diervilla rivularis*	S
Lanceleaf Trillium	*Trillium lancifolium*	S
A liverwort	*Aneura maxima*	S
A liverwort	*Cheilolejeunea evansii*	S
A liverwort	*Pellia X appalachiana*	S
A liverwort	*Plagiochila echinata*	S
A liverwort	*Radula sullivantii*	S
A liverwort	*Riccardia jugata*	S
Alabama Jamesianthus	*Jamesianthus alabamensis*	S
Mountain Camellia	*Stewartia ovata*	LR
Grass-of-Parnassus	*Parnassia asarifolia*	LR

Diana Fritillary	*Speyeria diana*	LR
Broadleaf Barbara's Buttons	*Marshallia trinervia*	LR
Riverbank bush-honeysuckle	*Diervilla rivularis*	S

MIS= Management Indicator Species
HI= High Interest Species
T= Threatened Species
LR= Locally Rare Species
S= Sensitive Species
EI=Ecological Indicator

Table 3.5.2.R - List of Species Associated with Forest Riparian Habitats

Seeps and Springs Habitat Association

(McDonald 2000)

Seep and spring habitats are not proposed for treatment by any of the alternatives. Therefore, the acreages of available seep and spring habitat will not change as a result of this Forest Health and Restoration Initiative. All seeps and springs will be protected through streamside management zone guidelines identified in the Forest Plan.

Springs are places where water flows out of the ground as a result of gravity or hydrostatic pressure. Some springs are seeps, in which the water flows out of sand, soil or gravel with no discernible outlet. Seeps are common along impermeable layers of shale or porous rocks which hold much water such as through sand or sandstones. The natural flow of springs is controlled by hydrologic and geologic factors such as the amount and frequency of rainfall, the porosity and permeability of the aquifer, the hydrostatic head pressure within the aquifer and the hydraulic gradient. Seepage communities are characterized by poorly drained soils, where groundwater surfaces and slowly moves down slope.

Species Associated with Seeps and Spring Habitats (21)

Common Name	Scientific Name	Status
Seepage Salamander	*Desmognathus aeneus*	LR

LR= Locally Rare Species

Table 3.5.2.S - List of Species Associated with Seeps and Spring Habitats

Habitat Generalists

(Wentworth 1999)

This habitat association includes species that are not closely associated with any specific rare communities, but can be found in a variety of forest habitats and successional stages. Some of the species known as habitat generalists require multiple forest and successional stages, for example deer and turkey. The plant species known as habitat generalists are found in a variety of forest conditions; therefore, available habitat for these plant species should not be affected by any of the alternatives. White-tailed deer and wild turkey require a mixture of forest types and successional stages to meet their annual needs. Key requirements include the interspersion of early successional habitats, late successional habitats, particularly mature oak stands, and agricultural openings. Due to the variety of conditions required, graphically displaying available acreages by alternative would be difficult. All alternatives will provide some habitat for deer and turkey. One alternative, Alternative 5, was developed to address deer and turkey habitat availability within the Black Warrior Wildlife Management Area.

Species Known as Habitat Generalists (12)

Common Name	Scientific Name	Status
White-tailed Deer	*Odocoileus virginianus*	MIS/GS
Eastern Wild Turkey	*Meleagris gallopavo*	MIS/GS
Winter Grapefern	*Botrychium lunarioides*	LR
Pink lady's slippers	*Cypripedium acaule*	LR

MIS= Management Indicator Species
GS= Game Species
LR= Locally Rare Species

Table 3.5.2.T - List of Species Associated with Habitat Generalists Habitats

Each of the action alternatives provides for a different combination, arrangement, and/or amount (acreage) of DFC's across the Bankhead National Forest. Subsequently, the combination, arrangement, and/or the amount of suitable habitat provided for associated terrestrial plant and wildlife species is different by each alternative. Each of the alternatives (2 - 6) provides combinations and amounts of DFC's that insure species diversity and viability are conserved or enhanced. But, there are differences among alternatives in the combination, arrangement, and/or amount of particular DFC's that will affect the assemblages of wildlife and plant species present.

Alternative 1 will not have cumulative beneficial effects on the wildlife and plant species of the Bankhead. Current conditions will persist, the threat of pine beetle epidemics will remain, if treatment is needed there would be a temporary period of early successional cover created. Several of the DFC's will not be represented and species associated with those DFC's will not benefit from the positive effects of increased availability and health of habitat. All of the actions alternatives will provide more positive effects for terrestrial wildlife and plant species than the no action alternative.

Alternative 2 provides the most habitat for early successional (grass/forb and shrub/seedling/sapling), glades, prairies and woodlands, and southern yellow pine forest associates over the entire forest landscape. This alternative provides the least habitat for mid- to late- successional deciduous forest and mixed mesic forest associates over the entire forest landscape. Northern bobwhite, Eggert's sunflower, sweet pinesap, brown-headed nuthatch, Bachman's sparrow, blue-winged warbler, and prairie warbler are examples of species that will benefit from the relatively large amount of woodland community types proposed. This alternative provides the least amount of dry mesic oak forest and dry-mesic oak-pine forest. Species that would be negatively impacted by having less available habitat of this type include cerulean warbler, Eastern wood-pewee, wood thrush, worm-eating warbler, the trilliums, ginseng, goldenseal, and gray and fox squirrel.

Alternatives 3 and 6 have no significant differences in the amount or arrangement of available habitats as compared to the other alternatives. These two alternatives provide for less mixed mesic and late successional habitats than alternative 4, but more than alternative 2. They provide for more early successional and woodland conditions than alternative 4, but less than alternative 5. There will be the least cumulative effect (positive or negative) on terrestrial plant and wildlife species if one of these alternatives is selected.

Alternative 4 provides the most habitat for mid- to late- successional deciduous forest, mixed mesic forest, and area-sensitive mid- to late- successional deciduous forest species associates over the entire forest landscape. However, it does not provide for the grass/forb habitat, shrub/seedling/sapling habitat, mixed xeric forest habitat, or southern yellow pine forest and woodland habitat associates in Area 2. This alternative provides the most positive/beneficial cumulative effects for species associated with the mesic and older hardwood forests, including cerulean warbler, hooded warbler, yellow-throated warbler, worm-eating warbler, pileated woodpecker, scarlet tanager, the trout lilies, butternut, puttyroot, Goldie's fern and gray and fox squirrels.

After Alternative 2, Alternative 5 provides the most habitat for the grass/forb habitat, shrub/seedling/sapling habitat, and mixed xeric forest habitat associates by providing additional oak woodland acreage in Area 1. This provision results in slightly less available habitat in Area 1 for mixed mesic forest habitat associates. This alternative provides the second most positive/beneficial cumulative effects for species associated with early successional and woodland community types, including Eastern cottontail, Northern bobwhite, Bachman's sparrow, blue-winged warbler, prairie warbler, the bluestem grasses, the milkweeds, and Eggert's sunflower. The mixed mesic forest habitat associates would be represented less in Area 1 with this alternative.

Habitat generalists, such as white-tailed deer and wild turkey, will benefit from all of the action alternatives. But, the action alternatives that emphasize a woodland component will provide additional benefits to these generalists by providing an early successional component over a long period of time, not temporary as in Alternative 1.

The amount and arrangement of the mixed mesophytic forest, which provides habitat for forest riparian, mixed mesic forest, mid- and late-successional deciduous forest and area sensitive mid- and late- successional deciduous forest associates, will not be affected by any of the action alternatives.

It is important to note that the effects presented here do not include the maintenance of early successional habitat in wildlife openings, roads, and power line right-of-ways. Across all alternatives, these areas will continue to provide a component of the early successional habitat available on the Bankhead.

An issue was raised over the dispersal of early successional habitat throughout the district. The DFC's that provide a "woodland" descriptive component such as Dry and Xeric Oak Woodlands, Xeric Pine-Oak Woodlands (Shortleaf Pine/Bluestem) and Longleaf Pine/Bluestem Woodlands (which encompass the grass/forb habitat associates, the shrub/seedling/sapling habitat associates, the Southern Yellow Pine Forest habitat associates and the Mixed Xeric Forest habitat associates) have a prescribed fire rate of 2-3 events in a 10-year period. Fire plays an essential role in pine-grassland communities by creating and maintaining open canopy conditions that perpetuate understory herbaceous plant communities (Masters et al. 1998). This prescribed burning regime ensures development and maintenance of early successional habitat under the overstory of a mature forest cover. These DFC's will provide suitable to optimal habitats for some game species and many of the high interest, ecological indicator species, and management indicator species. Positive cumulative effects would be long-term maintenance of the early successional habitat beyond the 3-5 year existence that one time establishment would produce, such as those found now in areas treated for southern pine beetle. Research efforts on other national forest lands in the southeast have found that nesting turkey did not readily utilize thick unburned areas (Kennamer 1997). A research effort in Arkansas utilized thinning and prescribed burning as the primary techniques for habitat improvement by enhancing growth of native forbs and legumes. Deer forage increased with the combination of the two practices as compared to controls (Masters et al. 1996).

The primary difference in the various alternatives is concerning the best assortment/arrangement of long-term habitat and the maintenance thereof for the selected species. There is a difference between the DFC's of the alternatives. This *primary* difference among the alternatives is the level of diversity and representation of early successional type, fire-dependent habitats across the landscape.

The various acreages to be treated by practices such as thinning, drum chopping, and site preparation burning by alternative are represented within the Vegetation Section. The effect of the various alternatives on current wildlife conditions, future habitat improvements and cumulative effects is reviewed in table 3.5.4.A below.

Table 3.5.4.A- Cumulative Effects on Wildlife by Alternative

	Alternative 1	Alternative 2	Alternatives 3 & 6	Alternative 4	Alternative 5
Effects on Major Game Species	Southern pine beetle areas provide early successional habitat for 3-5 years Southern pine beetle areas (early successional) decrease in availability and benefit as succession progresses Wildlife value of unthinned stands declines. Potential for resource damaging wildfire and pine beetle epidemic.	Provides most acres of fire dependent woodland community types. Also provides most acres of early successional habitat. All of these fire dependent and early successional acres are located in Areas 2 & 3. Provides the least habitat for mid- to late-successional deciduous forest and mixed mesic forest associates.	Provides more fire dependent woodland acres and early successional acres less than Alternative 4 and less than Alternatives 2 and 5. All acres are in Areas 2 & 3.	Least amount of fire dependent woodlands and early successional acres. All woodland acres are in Area 3. Provides most mixed mesic and mid to late successional habitats.	Habitat required by game species represented in all areas of forest (including Black Warrior Wildlife Management Area) This alternative allows for more acres of fire dependent woodlands and early successional than all other alternatives except Alternative 2 Woodland acres are represented in all areas of forest. Best distribution of woodland acres and early successional habitat.

Effects on PETS (Terrestrial)	Snags will develop due to unhealthy condition benefiting Indiana bats. Overall forest health will decline. Potential for resource damaging wildfire. Southern pine beetle areas provide foraging areas for Indiana bat foraging but will decline over time.	This alternative provides for the most early successional and mixed xeric habitats. Potential habitat for clammy locust, sweet pinesap & eggert's sunflower increase. This alternative provides for the second least amount of mixed mesic, area sensitive, and mid- to late-successional deciduous habitat.	More habitat for Indiana bats present with these alternatives than with all others except Alternative 4. These alternatives will provide the second most habitat for plant species associated with mixed mesic and mid- to late-successional deciduous forest habitats. May provide more habitat than previously available for sweet pinesap, eggert's sunflower, clammy locust and Indiana bats.	Most habitat for Indiana bats present with this alternative. This alternative will also provide the most habitat for plant species associated with mixed mesic and mid- to late-successional deciduous forest habitats.	May provide more habitat on long term basis than previously available for sweet pinesap, eggert's sunflower, clammy locust and Indiana bats. Improves habitat for forest foraging bats.
	Alternative 1	**Alternative 2**	**Alternatives 3 & 6**	**Alternative 4**	**Alternative 5**
Effects on Forest Habitat and Associated Species	Current populations should be maintained in community types present (particularly mixed mesic, area sensitive, and mid- to late- successional deciduous forest habitats.) Current populations associated with Southern Yellow Pine, Early Successional (grass/forb and shrub/seedling/sapling) and Mixed Xeric Forest habitats will decline.	Provides most acres of fire dependent woodland community types. Provides most acres of early successional habitat. All of these woodland community acres are located in Areas 2 & 3. Provides the least habitat for mid- to late-successional deciduous forest and mixed mesic forest associates.	Provides more fire dependent woodland acres and early successional acres less than Alternative 4 and less than Alternatives 2 and 5. All acres are in Areas 2 & 3.	Least amount of fire dependent woodlands and early successional acres. All woodland acres are in Area 3. Provides most mixed mesic and mid- to late-successional deciduous forest habitats.	This alternative allows for all habitat associations (community types) to be represented on all areas of the forest. More acres provided of the woodland type and early successional type than all other alternatives, except Alternative 2.

Overall Effects	This alternative will not have an overall long term benefit for terrestrial wildlife species.	This alternative treats the most acres and would have the largest impact to terrestrial wildlife habitat. Although, all acres proposed for treatment are located within Areas 2 and 3.	These alternatives would benefit terrestrial wildlife. They would provide more mixed mesic and area sensitive habitat than Alternative 5, but less early successional habitat. These alternatives provide more of the early successional habitat than Alternative 4.	This alternative will provide the most habitat for Mixed Mesic Forest, Mid- to Late-Successional Deciduous Forest and Area Sensitive Mid- to Late-successional deciduous forest associates. Early successional habitat with this alternative will be limited. Early successional habitat will be primarily found in Area 3 with this alternative.	This alternative will have the most overall benefit to terrestrial wildlife species across the landscape due to the variety of community types represented over the whole forest and the amount of disturbance created through prescribed burning.
	Alternative 1	**Alternative 2**	**Alternatives 3 & 6**	**Alternative 4**	**Alternative 5**

Table 3.5.4.A- Cumulative Effects on Wildlife by Alternative

3.5.5 Monitoring

Monitoring of terrestrial wildlife and plant resources will be conducted by project specific surveys and will document the occurrence and or presence of species documented above on a case-by-case basis. Species listed in the species of concern (Table 3.5.2.A) that are known to be present from surveys for this project will be identified during planning, needed protection mechanisms will be instituted and monitored through the project implementation. Game/Harvest data collected from the Black Warrior Wildlife Management Area will be used to address the trends for some of the MIS. Bat trapping and cave monitoring will be used to determine long-term effects on the bat population of the Bankhead N.F. Landbird monitoring through bird point count surveys will continue to be conducted on a yearly basis during the spring. This data will be collected and added to the database maintained on the regional level in order to discern trends in bird populations. Breeding Bird Survey data will be reviewed. Long term land cover and vegetation understory will be monitored through photo-points used to identify cumulative changes induced by prescribed burning.

Monitoring and evaluation provide information to determine whether programs and projects are meeting Forest Plan direction. Monitoring and evaluation is required by NFMA implementing regulations (36 CFR 219.19) to determine whether requirements of the regulations and Forest Plan are being met. FSM 2620 defines management indicators as plant and animal species, communities or special habitats selected for emphasis in planning, and which are monitored during forest plan implementation in order to assess the effects of management activities on their populations and the populations of other species with similar habitat needs which they may represent.

Surveys and monitoring are conducted at the District, Forest and Regional level. Forest Service personnel, contractors, and volunteers with demonstrated expertise in bird identification and survey methodology conduct point count surveys for breeding landbirds annually at 122 points across the Bankhead District. Point count survey data is collected and used at the regional level for trends analysis.

Data from Breeding Bird Surveys (BBS) are analyzed at the regional level, as well. The BBS is a large-scale survey of North American birds. It is a roadside survey, conducted in June by experienced volunteer birders. The primary objective of the BBS has been the estimation of population change for songbirds. Data is maintained and analyzed by the US Geological Survey, Patuxent Wildlife Research Center. One BBS route traverses the Bankhead, with three other routes located in the immediate vicinity of the Forest.

Harvest data for white-tailed deer and Eastern Wild Turkey are collected annually on the Black Warrior Wildlife Management Area. Additionally, spotlight surveys for white-tailed deer are conducted annually on the Bankhead. Two established routes (Black Warrior WMA route and Bankhead route) are surveyed by Forest Service personnel and volunteers and Alabama Department of Conservation and Natural Resources, Division of Wildlife and Freshwater Fisheries personnel.

Data and trends information from these survey efforts are located within the project file.

The Proposed Revised Land and Resource Management Plan (LRMP) for the National Forests in Alabama establishes monitoring questions that address whether the desired conditions, goals and objectives of the *Forest Plan* are being met and whether *Forest Plan* standards are effective. Monitoring (information or data collection) will be conducted at the District level and at the Forest level to evaluate the *Forest Plan*. To achieve plan-level monitoring and address the monitoring questions in the LRMP, District personnel will continue to conduct landbird point count surveys and white-tailed deer spotlight surveys. Harvest data for white-tailed deer and

Eastern wild turkey will continue to be maintained at the Bankhead District office. Breeding Bird Surveys will continue to be conducted.

A program to monitor prescribed fire effects is being implemented on the District. This monitoring program will be used to evaluate hazard fuel reduction and vegetative effects from prescribed fire projects. The monitoring program utilizes Brown's 1974 transect and plot monitoring methodology. The vegetative effects portion of this monitoring program consists of monitoring over story, mid story, and understory fire effects and can be used as an additional tool to address some of the monitoring questions set forth in the LRMP.

3.6 Air Resources

3.6.1 Issues

There are two potential air quality issues for prescribed burning. One relates to the portion of smoke that's emitted with sufficient heat to raise it into the atmosphere for dispersal above the zone of human exposure. A second relates to the portion of smoke that is emitted with insufficient heat: the portion that must be dispersed within the zone of human exposure.

Smoke that is adequately dispersed via lift into the atmosphere can create health and regional haze issues. A lack of solid information has led to some question about the role of woodland fire smoke in the regional haze issue. As discussed in the DRLRMP, particulates from such smoke may contribute as little as 1.5% to the Southern Appalachian regional airborne fine particulate budget

Woodland fire smoke is just one of many source categories for fine particulate matter (PM), the primary contributor to regional haze. Because all fine PM and their precursor chemicals may travel hundreds of miles while they remain suspended in the air, the southeastern States have formed a regional organization, VISTAS (Visibility Improvement State & Tribal Association of the Southeast, www.vistas-sesarm.org), to address such questions and to consider regulations that will reduce regional haze. The Forest Service is a participant in VISTAS and hopes to see this issue resolved in the near future. However, while this project proposes a large increase in the Bankhead burning program; prescribed fire remains a small source, overall, of PM in northwest Alabama. Because there are no irretrievable commitments or irreversible effects on visibility and other Bankhead resources; for now, there is little risk in proceeding without more definitive information on the regional haze issue.

The primary purpose of the National Ambient Air Quality Standards (NAAQS) is public health protection. Further, state and federal guidelines for sitting air quality monitors strongly favor locations where populations may be exposed to significant accumulations of air pollutants. Because the Alabama Department of Environmental Management (ADEM) operates such monitors in several counties near the Bankhead, we will use attainment/non-attainment of NAAQS at these monitors to serve as a proxy issue in the place of "public health".

Smoke that must be dispersed within the human environment due to insufficient lift can encounter nuisance, safety and occasional health issues.

3.6.2 Affected Environment

The Bankhead National Forest contains approximately 181,000 acres of federal land, distributed within three Alabama counties: Franklin, Lawrence and Winston. Over the last three years, the U.S. Forest Service has completed prescribed burning (for all purposes) on these lands at a rate that averages 8,214 acres per year. The amounts for each fiscal year (2001, 2002 & 2003) were 9553, 6243 and 8847 acres, respectively. As discussed within the (Draft) Revised Land and Resource Plan – National Forests in Alabama and its (Draft) Environmental Impact Statement

(DRLRMP), currently in public review), the Forest Service is planning to increase annual prescribed burning, Forest-wide and on the Bankhead. Air quality information and discussions provided in the DRLRMP are included here by reference.

3.6.3 Environmental Effects

The preferred alternative identified in the DRLRMP proposes to burn 95,000 acres per year (State-wide, including site-prep burns). That's up 27% from the recent average of 75,000 acres per year. The Bankhead Forest Health & Restoration Project anticipates an increase in prescribed burning (for all purposes) on the Forest by as much as 52% (Alternative 5).

Alternative 1, prescribed burning would remain at 8,200 acres per year (no change). Alternative 5 proposes to increase prescribed burning to 12,500 ac/yr, a 52 % increase.

Alternatives 2, 3, 4 & 6 each propose to increase in prescribed burning to 10,000 acres per year; with the alternatives having different systems for setting priorities among potential burning sites. Each of these four Alternatives represents a 22% increase in prescribed burning.

In all six alternatives, no more than 5% of the burning would be moved to the growing season. In the last 3 years, there have been no growing season burns on the Bankhead.

The fate of forest fire emissions (smoke) is twofold. Most (usually more than 60%) of the emissions are "lifted" by convection to a fluctuating boundary in the troposphere known as the mixing height. From mixing height, these emissions are dissipated by horizontal and downward dispersion above nearby counties. The balance of the emissions (less than 40%) remains in intermittent contact with the ground.

The risk of smoke impact on the human environment differs between the two portions of smoke plume. Turbulent surface winds move ground smoke erratically and it stays in intermittent contact with the human environment. In comparison to smoke aloft, human exposure to ground level smoke is: limited to a smaller area, relatively brief (a few hours) and more intense.

The impact of smoke aloft is usually not realized until dispersal mechanisms bring dissipated portions of lifted smoke back to ground level. Because the smoke has already dispersed over a broad and deep volume of air, the concentration at ground level is minimal. Because the dispersal area is broad, the duration of exposure within that area may, however, last for the better part of a day. Decades ago, the impact of such dispersed emissions went unnoticed because they were merely an intermittent contribution of minor amount to relatively clean air. Because of these differences, the impacts of "ground level smoke" are discussed in the following Effects section, while the impacts of "smoke aloft" are discussed as cumulative effects.

Effects

Ground Level Smoke: This part of the smoke plume does not have enough heat to rise into the atmosphere. While smoke aloft is already dispersed before it returns to the human environment, ground level smoke must dissipate within the human environment. It is dissipated by dispersion and deposition of smoke particles on vegetation, land surfaces and other objects.

The potential for ground level smoke to create a nuisance has long been obvious. Where there's enough smoke to cause a nuisance, remedies are straightforward. Anyone negligently creating or continuing a nuisance can be held accountable. What constitutes a nuisance is not often defined but generally includes a property use that significantly impairs the use of another property due to some health, safety or economic consideration. What constitutes "enough" smoke, in terms of a specific concentration or duration, is seldom mentioned

Ground level smoke is neither a new nor a rare phenomenon in the vicinity of the Bankhead. Its impacts generally are limited to an area extending a few miles downwind of the originating fire. Forest Service personnel most frequently, limit the level of impact by applying mitigation measures (Chapter 2, Mitigation Measures). They have not reported any recurring complaints regarding ground level smoke from prescribed burning fires.

3.6.4 Cumulative Effects (Air)

Smoke Aloft: Until recent decades, the impact of the lifted portion of smoke was ignored. As community and industrial development increasingly dotted the landscape with perennial air pollution sources, the smoke we sent aloft could no longer be ignored. The Forest Service has become concerned that even its minor contribution of air pollutants might be enough to cause already dirty air to violate air quality standards.

Current Air Quality v. NAAQS: The NAAQS, set under authority of the Clean Air Act (CAA), cover six "criteria" airborne pollutants: lead, sulfur dioxide, carbon monoxide, nitrogen oxides, ozone and particulate matter. The DRLRMP (2/2003) discusses air quality standards and air quality throughout the Forest. That discussion has been included here by reference. Since that writing, however, relevant air quality data has become available for ozone and particulates (PM2.5) for CY-2002 and the last 4 months of CY-2001. Those new data are included in the following discussion.

Ozone (O3)

Forest fires emit moderate amounts of *volatile organic compounds (VOC)* and small amounts of *nitrogen oxides (NOx)*. These are precursors to formation of *ozone (O3) in the earth's troposphere***.** Here, fire related emissions become important only when other persistent and larger pollution sources already present a substantial base load of O3 precursors or when there is a threat of atmospheric confinement. In some circumstances, additional intermittent emissions might aggravate an already bad situation.

Historically, Alabama has had trouble in attaining the NAAQS ozone standard only in Jefferson and Shelby counties. This may change, however, as recent revisions to the standard are proving to be more difficult to meet. At this writing, ADEM reports the results of 24 ozone monitors, spread among 15 counties, across the state. Summary data from monitors in seven counties near the Bankhead are shown below.

NAAQS-Ozone Standard: O3 monitors run continuously throughout the growing season (Apr. thru Oct.). They provide up to 5036 hourly values which result in 5028 " 8-hour running averages", per year. Attainment of the standard occurs: when the mean of the yearly fourth-highest "8-hour running average" values, over three consecutive years, does not exceed 0.08 ppm.

Bringing the new year of data (CY-2002) into the analysis improves the outlook for counties near the Bankhead regarding attainment of the NAAQS ozone standard. At several monitors, 2002 registered cleaner air than did 1999. While Jefferson County will remain in "non-attainment" status, it appears that Lawrence, Morgan and Madison Counties may avoid that designation. The process for designating non-attainment areas under the new "8-hour" ozone standard will begin in mid-2003.

COUNTY	FIRST thru FOURTH HIGHEST of All 8-HOUR OZONE Concentrations Reported for Year (units = parts per million)												3-Year Avg. of 4th Highest Annual Values
	2000				2001				2002				
	1 st	2 nd	3 rd	4 th	1 st	2 nd	3 rd	4 th	1 st	2 nd	3 rd	4 th	
COLBERT									.092	.089	.088	.084	**.084**
JEFFERSON	.103	.102	.094	.092	.093	.088	.087	.086	.098	..096	.086	.086	**.088**
LAWRENCE	.094	.085	.084	.083	.076	.074	.072	.071	.085	.083	.081	.080	**.078**
MADISON	.100	.093	.088	.088	.081	.080	.080	.080	.092	.087	.081	.078	**.082**
MORGAN	.100	.097	.093	.091	.093	.079	.078	.077	.095	.093	.088	.087	**.085**
TUSCALOOSA					.102	.083	.082	.081	.092	.086	.084	.083	**.082**
WALKER									.092	.091	.089	.083	**.083**

Table 3.6.3.A - Summary of Ozone monitoring reported by State of Alabama (2000-2002). These summary data (all but last column) are from EPA web page "www.epa.gov/air/data" (5/19/2003). "3-Year Averages" were calculated by the author. The following information is helpful in understanding the data presented above. Ozone monitors run continuously, generally from mid-spring through mid-autumn, recording a mean concentration for each hour. As the data presented above are 8-hour running averages (calculated from the base data), there are still 24 values for each day. Only one (the highest) value per day is used for evaluating attainment of this standard. This table presents only the 1st through 4th highest of roughly 230 daily values generated per year. The 4th highest value for each year and the 3-year average of those values (highlight-ed) are critical for evaluating attainment of NAAQS.

So far we've discussed five of the six CAA criteria pollutants. In each case it was found that current conditions in the affected environment are acceptable or that prescribed burning is a minor contributor to air pollution problems. A closer look at the current situation for ***particulate matter*** (PM) is warranted because it is by far the most significant air pollutant emitted from forest burning.

Particulate Matter (PM)

NAAQS for PM is a complex standard. For many years, it regulated fine and medium size particulates under the same PM10 rule, as though both posed the same health risk. PM10 refers to particles less than or equal to 10 microns in diameter. Recent court decisions do, however, support a renewed focus on the special health hazard of fine particulates. Along with the old PM10 standard, we now have the tougher PM2.5 (fine particle) standard that aims at particles with a diameter less than or equal to 2.5 microns.

NAAQS-PM2.5 Standard: PM2.5 monitors filter air for complete 24-hour periods. They're most often set up to operate on a 3-day cycle, providing approximately 122 samples per year for analysis. Attaining this standard requires that 98% of the 24-hour samples shall show a PM2.5 concentration not exceeding 65 micro-grams per cubic meter (ug/m^3). The standard further requires that the annual mean of these 24-hour sample values shall not exceed 15 ug/m^3, over a running 3-year averaging period.

At this writing, ADEM reports results from 28 PM2.5 monitoring locations, statewide. Summary data from monitors in the six counties most near the Bankhead are shown below.

COUNTY	**SUMMARY** of **24-HOUR PM2.5** Samples Reported for Year (unit = micro-grams per cubic meter)									**3-Year Average of**	
	2000			**2001**			**2002**			**98 th Percentile**	**Annual Means**
	98 th Percentile	Annual Mean	Number of Samples	98 th Percentile	Annual Mean	Number of Samples	98 th Percentile	Annual Mean	Number of Samples		
COLBERT	32.0	15.6	106	29.0	12.8	100	34.0	12.8	96	31.7	13.7
JEFFERSON	53.0	22.3	352	43.0	19.1	352	36.0	16.6	357	44.0	19.3
MADISON	42.0	16.3	120	30.0	14.6	121	34.0	13.8	116	35.3	14.9
MORGAN	44.0	18.3	83	33.0	15.7	94	31.0	13.1	112	36.0	15.7
TUSCALOOSA	38.0	16.5	105	22.0	11.5	16*	18.0	10.4	12*		
WALKER	36.0	18.0	65*				25.0	11.5	28*		
	* Statistics related to these samples not used. Number of samples too low or, sampling did not represent whole year.										

Table 3.6.3.B - Summary of PM2.5 monitoring reported by the State of Alabama (2000-2002). Entries for each year are from EPA web site "www.epa.gov/air/data" (5/19/2003). The 3-year averages of annual means and 98th percentiles were calculated by the author. The following information is helpful in understanding the data above: **a)** While most PM2.5 monitors run for continuous 24-hr periods, generally every 3rd day, providing up to 122 values per year; some monitors operate on different schedules. A few operate daily, giving up to 365 values per year. **b)** Monitors suitable for PM2.5 attainment networks were developed just recently. Technical problems reduce the number of useful sample values. **c)** While there are no problems with the 24-hour part of the PM2.5 standard (represented by the 98th percentile statistic), the data do show some problems with the annual mean part. Columns containing these critical values are highlighted.

Bringing the new year of data (CY-2002) into the analysis improves the outlook for counties near the Bankhead for the potential attainment of the NAAQS PM2.5 standard. At the four fully monitored locations, 2002 registered cleaner air than did 1999. While Jefferson County may still fall into "non-attainment" for PM2.5, it appears that Colbert and Madison Counties may avoid that designation. The situation for Morgan County is precarious. The process for designating non-attainment areas under the new "PM2.5" particulate standard will begin early in 2004 and it's impossible to tell what conditions will be revealed by the CY-2003 monitoring data.

Risk of NAAQS Non-Attainment

As shown in previous discussion, the creation of additional pollution sources in the rural landscape and the tightening of air quality standards present a situation where the air masses we burn into can seldom be described as "clean". While smoke from prescribed burning fire is still an intermittent contribution of minor proportions, it nonetheless must be counted among the many "straws" that have accumulated on, and threaten the integrity of, the "camels back" (NAAQS).

Alternative 1 poses no risk of causing NAAQS non-attainment because it represents no change in an ongoing prescribed burning program during a time when non-attainment has not occurred. Alternatives 2, 3, 4 & 6 pose a small risk of creating a non-attainment situation even though they represent a moderate change in the ongoing program.

Alternative 5 represents a large emissions increase from a source that is a small contributor to the emissions budget impacting northwest Alabama. It poses a moderate risk of causing PM2.5 non-attainment and a slight risk of causing ozone non-attainment. The following section on "Monitoring " describes mitigation measures that will help limit the risk that Alternative 5 may cause NAAQS non-attainment.

If any of the counties near the Bankhead eventually fall into ozone non-attainment, prescribed fire should be considered only as a very small source. Consider the following:

- In much of the rural South, O3 formation tends to be NOx limited and prescribed burning fire is not usually a major NOx source when compared to other sources.

- Weather and climate conditions in this area tend to preclude prescribed burning fire from becoming a significant contributor to O3 non-attainment. Most O3 events occur during the summer, as warm high pres-sure air masses stagnate over an area, limiting atmospheric ventilation. Under these conditions, forest fuels often become too dry to risk having a prescribed burn escape as a wildfire. Further, the Forest Service is planning to conduct no more than 5% of the Bankhead burning program during the growing season.

If O3 non-attainment does occur, it should be realized that the Bankhead, although a small contributor to the problem, must participate in its resolution. ***Ozone non-attainment results from high readings during sets of bad days***. If the Forest Service (or the prescribed burning community as a whole) continues its relatively low rate of ozone precursor emissions, it can deal with the situation by accepting burning restrictions on the "bad days". Such days usually occur during the middle and later parts of the growing season.

If counties near the Bankhead eventually fall into PM2.5 non-attainment, prescribed fire should be considered as a small source of emissions. See discussion in DRLRMP. The Forest, again a small contributor to the problem, still must participate in its resolution. ***The PM2.5 statistics show a problem that is not limited just to "bad days".*** While the 98th percentile values do not approach the daily (24-hour) standard of 65 ug/m^3, there are two monitors near the Bankhead whose 3-year average of mean annual PM2.5 values exceed the annual standard of 15 ug/m^3. Emissions of PM2.5 pollutants or their precursors, even on "clean" days, add to the problem.

3.6.5 Monitoring

Dealing with the risk that smoke sent aloft might contribute to a NAAQS non-attainment designation of a nearby county is relatively new for Bankhead personnel. "Emissions from prescribed burning will not disproportionately hinder state progress towards attaining air quality standards or visibility goals" is expressed in Chapter 2 of the DRLRMP as a fire management goal for the NFsAL. This means that the Bankhead National Forest may make any changes in the prescribed burning program that conforms to the LRMP, as long as there is no significant risk that doing so will push a nearby county into non-attainment. Further, even without an increase in prescribed burning, if any Bankhead lands are included in an area that falls into non-attainment, the Forest Service will participate with the appropriate air emissions community and regulatory agencies to resolve the problem.

In practical terms, the preceding paragraph means that Forest Service personnel will keep an eye on trends that appear in air quality data from the nearby counties and then adjust planned increases in its prescribed burning program to avoid being the cause of a problem. As an example, under Alternative 5, the Forest Service anticipates an increase in prescribed burning on the Bankhead to a 12,500 ac/yr. As a measure to mitigate against causing NAAQS non-attainment in nearby counties, prescribed burning on the Bankhead will be immediately reduced to the level that existed before this proposal (8,200 ac/yr) whenever air quality information for any nearby county (except Jefferson County) shows at least one year below the annual part of the NAAQS ozone or PM2.5 standard. Jefferson County is excepted at this time because it is clear by the scale and persistence of its problem that the Bankhead's burning is an insignificant source.

Because of the time lag between the Bankhead's busiest burning season (January – February) and publishing of the relevant annual air quality statistics (14 months), it's important that this burning program reduction be accomplished quickly. Consider that the final annual air quality statistics for CY-2002 were not published until April, 2003. By that time, the Bankhead 2003 burning program was largely completed and little opportunity remained to help with reducing total emissions in the area for that year. The key to the annual parts of PM2.5 and ozone NAAQS standards is the "3-year running average". While a county may have three years to effect emissions reductions, it can be half way through that period before a problem becomes evident. In the case of prescribed fire emissions, if the overall air quality in 2002 had been poor; the relevant data could, at best, trigger emission reductions only by 2004. That would be the last year of the 3-year period wherein a reduction of its 3-year running average could be attempted.

Monitoring for "Compliance with (the CAA) State Implementation Plan and internal Forest Service provisions for smoke management" is further described as Task # 34 in Appendix F of the DRLRMP. That information, including methods of data collection, is included here by reference. Specific "Appendix F" information for the monitoring described in the preceding paragraphs is: schedule = annual, in April; reporting = annual; precision = high; reliability = high; responsibility = Bankhead staff and Zone air quality specialist.

3.7 Visual Resources

3.7.1 Issues

Scenery, being the general appearance of place, is then the means by which recreation settings are described. Proposed activities in this EIS will have both beneficial and adverse effects on scenery and thus recreational experiences. Some proposed treatments would diminish visual quality for short times. This may disperse or disappoint forest visitors and causal viewers. These same treatments may improve visitor's visual experiences in the long run by creating open park like stands of timber and increasing the opportunity to view wildlife.

3.7.2 Affected Environment

The affected environment includes the entire 180,000 plus acres of the Bankhead National Forest and adjacent private land with views into the Forest.

The Bankhead National Forest may be described by referring to descriptions of its phsiographic section as described by Bailey and others. The Bankhead is part of Southeastern Forest Province, Southern Cumberland Plateau Section. Distinctive, common, and undistinguished examples of the Southern Cumberland Plateau Section occur on this forest. Most of the landforms are deeply dissected and dendritically drained.

The forest is generally covered with an almost continuous canopy of soft to medium textured rounded tree forms, creating a natural-appearing landscape character. However, since the late 1990s, as a result of the Southern Pine Beetle (SPB) infestation that killed large numbers of pine trees, significant parts of the canopy have opened. Groups of tall, gray, defoliated stems, generally varying in size from less than an acre to major openings litter the forest. Private land inside the proclamation boundary is mostly agriculture or forest with some strip mining on the south end.

Landscape character is described as the particular attributes, qualities, and traits of a landscape that give it an image and make it identifiable or unique. Landscape themes refer to the general focus or subject of variations on landscape character settings. They may be thought of as detailed description of desired landscaper character. Themes range from a natural to an urban landscape. Of the seven Land Use Themes described in the Southern Appalachian Assessment, Bankhead National Forest landscapes can be grouped predominantly into three:

- Natural Evolving
- Natural Appearing
- Rural-Forested.

The vast majority of the forest is characterized as Natural Appearing. Designated Wilderness (25,852 acres or 14%) is areas where ecological processes predominate and are characteristically Natural Evolving landscapes. Rural-Forested is a very small category that includes places like Clear Creek and Corinth Recreation Areas.

Cultural features are present, often obvious, and represent the varied peoples who have lived and used the land now know as the Bankhead National Forest. Fire towers, cemeteries, old house sites, springs, stills, and bluff shelters are all found on the forest. Many of these features have become special places requiring appropriate visual settings.

The scenic resources of the Bankhead National Forest are currently managed in accordance with the 1986 LRMP. The scenic resource management direction in the LRMP is governed by the Visual Quality Objectives (VQOs). The Visual Management System (VMS) determined these VQOs. The Scenery Management System (SMS) replaced the VMS with the issuance of Landscape Aesthetics, A Handbook for Scenery Management, Agricultural Handbook Number 701 in 1995. The revised plan (DRLRMP) is expected to be more protective of visual resources because more acres are expected to be assigned SIOs of moderate or higher.

It is expected that the bulk of the work proposed in this EIS will be accomplished under direction of the DRLRMP, not the LRMP. SMS will then govern all scenery management. The SMS assigns values just as the VMS assigned VQOs. SMS values are termed Scenic Integrity Objectives (SIOs), and they range from Very High (VH), High (H), Moderate (M), Low (L), to Very Low (VL). SIOs define the level of integrity or the alteration allowed to maintain scenic integrity.

The table below describes the crosswalk between VQOs and SIOs.

Visual Quality Objective (VQO)	Scenic Integrity Objective (SIO)
P Preservation	VH Very High
R Retention	H High
PR Partial Retention	M Moderate
M Modification	L Low
MM Maximum Modification	VL Very Low

Table 3.7.2.A - VQO, SIO Crosswalk

3.7.3 Environmental Effects

Alternative 1 (no Action)

This alternative will not immediately affect visual resources. As time passes, natural processes will change the visual character of the forest. These changes are expected to be generally pleasing to most, provided no catastrophic insect, disease, or storm events occur. Even these potential occurrences would be acceptable to a portion of forest visitors. However, allowing overstocked stands of off-site species to continue is an invitation for insect or disease disasters. This alternative also loses the opportunity to foster additional places that will feature scarce and appropriate ecosystems. This alternative does not provide direction for increasing longleaf/bluestem woodlands, shortleaf/bluestem woodlands, or xeric oak forests and oak woodlands. Finally, this alternative misses the chance to speed up the healing of pine beetle scared landscapes.

Alternative 2 (proposed Action)

Manipulating the environment in order to achieve the desired future conditions will certainly affect landscape character. The visual short-term effects from traditional logging and site preparation are expected to be negative; however, the long-term effects of this alternative are predicted to be positive. Replacing off-site loblolly pines with hardwoods, shortleaf pine, or longleaf pine, each in their proper ecological place, is expected to result in healthier, more diverse, and therefore, more visually pleasing forests. Diversity is the antidote for monotony. Restoring SPB openings to their appropriate ecological character will increase biological diversity quicker than waiting on natural processes.

The proposed thinning activities are expected to provide little change in the scenic integrity of the landscape. Effects will be evident during logging and for a short time thereafter. The expected effects are the shrubs and herbaceous plants killed or damaged by the thinning operations.

This alternative includes more acres of proposed traditional logging; therefore, this alternative has the most short-term negative effects to the scenic resource. This includes 18,143 acres of thinning and 7,382 acres of SPB restoration. The restoration work includes roller drum chopping, prescribed fire, and/or hand tool minimal effects work. The hardwood restoration work occurs entirely in the SPB areas and since the proposed activity only includes prescribed fire, hand tools, or no treatment, these acres may be considered as having no negative effects. An exception would be cut and leave tree felling, which will appear as incongruent and thus will be a negative landscape element to close viewers.

Wildfire is a natural process and prescribed fires are designed to mimic wildfires. Fire lines could result in negative visual effects if not properly located and built. Prescribed burns are expected to cause, a blackened forest floor, scorched bark on some trees, and smoke and ash during actual burning. However, the evidence of these perceived negative effects will not last long and color contrast caused by winter burns is minimal. Green-up will occur the following spring, and fire is a major tool in obtaining the desirable open park-like forest.

The visual effects to the developed recreation sites (Clear Creek, Corinth, Houston) are important even with mitigation measures. Visitors are expected to find thinning operations visually negative during and immediately after the work. However, these loblolly thinnings are appropriate given the SPB attack alternative. The Pine Restoration work in the developed recreation areas may be considered similar to severe storm damage clean up which is appropriate for these rural-forested places.

The visual effects to the Owl Creek Horse Trail System in Area 2 are important even with mitigation measures. Riders are expected to find these effects negative, but they are not negative to the land itself. And the proposed treatments are not visually negative in the long run.

This alternative, as all the alternatives, is expected to meet the VQOs provided the listed mitigation practices are accomplished. Full compliance with the existing line, color, and texture in the partial retention areas are expected within one year for all the thinning activities. Compliance is also expected for the thinning occurring in the retention areas provided there is particularly careful application of mitigation measures.

The 34 acres of hardwood restoration proposed for the Sipsey Wild and Scenic River will be accomplished natural regeneration without site preparation, (natural processes). Other hardwood restoration work will use the same tools with less intensive mitigation. Longleaf and Shortleaf

Pine Restoration work in retention areas may not immediately meet the VQO; however, SPB spots are not considered areas deserving of protection.

	Pine Thinning	Pine Restoration	Hardwood Thinning	Hardwood Restoration
Preservation	0	0	0	34*
Retention	395	397	708	239
Partial Retention	326	131	2087	960

*Sipsey Wild & Scenic River

Table 3.7.3.A - Acres of Affected Selected VQO for Alternative 2

Alternative 3

This alternative will have the same effects described in Alternative 2 except the proposed treatment acres are significantly reduced.

This alternative, Alternative 5, and Alternative 6 includes fewer acres of proposed traditional logging as compared to Alternative 2; therefore, it has less short-term negative effects to the scenic resource. The proposed work includes 9,452 acres of thinning and 6,860 acres of SPB restoration, which means less accomplishment than Alternative 2; therefore, less long term scenic improvement.

	Pine Thinning	Pine Restoration	Hardwood Thinning	Hardwood Restoration
Preservation	0	0	0	34*
Retention	83	39	461	561
Partial Retention	109	37	764	935

*Sipsey Wild & Scenic River

Table 3.7.3.B - Acres of Affected Selected VQO for Alternative 3

Alternative 4

This alternative will have the same effects described in Alternative 2 except the proposed DFC for Area 2 is upland hardwood and has no DFC of shortleaf/bluestem woodlands communities. This is desirable visually provided the viewer favors closed canopy hardwood forests without the diversity of open woodland conditions distributed over the area. The result of applying this alternative is the opportunity loss of increasing the under-represented shortleaf/bluestem woodlands communities. Diversity will not be increased.

This alternative has the least acres of traditional logging of all the alternatives; therefore, it has the least short-term negative effects to the scenic resource. The proposed hardwood restoration under these proposals will be light on the land and this further improves this alternatives position in regards to short-term effects. The proposed work includes 8,627 acres of thinning and 6,833 acres of SPB restoration which means less accomplishment than Alternative 2; therefore, less long term scenic improvement.

	Pine Thinning	Pine Restoration	Hardwood Thinning	Hardwood Restoration
Preservation	0	0	0	46*
Retention	50	27	491	561
Partial Retention	35	4	823	968

*Sipsey Wild & Scenic River

Table 3.7.3.C - Acres of Affected Selected VQO for Alternative 4

Alternative 5

This alternative will have the same effects described in Alternative 2 except this alternative emphasizes increased oak woodland and grass/shrub habitat in Area 1. More frequent burning will be required to achieve this condition. The increased burning will increase the short term burning effects, but additional oak woodland habitat will increase biological diversity, which will increase visual diversity.

This alternative, Alternative 3, and Alternative 6 includes fewer acres of proposed traditional logging as compared to Alternative 2; therefore, it has less short-term negative effects to the scenic resource. The proposed work includes 9,452 acres of thinning and 6,860 acres of SPB restoration, which means less accomplishment; therefore, less long term scenic improvement.

	Pine Thinning	Pine Restoration	Hardwood Thinning	Hardwood Restoration
Preservation	0	0	0	34*
Retention	83	39	461	561
Partial Retention	109	37	764	935

*Sipsey Wild & Scenic River

Table 3.7.3.D - Acres of Affected Selected VQO for Alternative 5

Alternative 6

Alternative 6 will have the same effects described in Alternative 2 except for the differences described in Alternative 3. Alternative 6 is the same as Alternative 3, except all treatments in Alternative 6 will be contracted (no commercial logging). The proposed action is exactly the same; therefore, visual resource effects will be the same. Should one method of contracting the work be inherently superior to the other in regards to protecting visual resources, then that superior method would be preferred over the other.

This alternative, Alternative 3, and Alternative 5 includes fewer acres of proposed traditional logging as compared to Alternative 2; therefore, it has less short-term negative effects to the scenic resource. The proposed work includes 9,452 acres of thinning and 6,860 acres of southern pine beetle (SPB) restoration which means less accomplishment; therefore, less long term scenic improvement.	Pine Thinning	Pine Restoration	Hardwood Thinning	Hardwood Restoration
Preservation	0	0	0	34*
Retention	83	39	461	561
Partial Retention	109	37	764	935

*Sipsey Wild & Scenic River

Table 3.7.3.E - Acres of Affected Selected VQO for Alternative 6

3.7.4 Cumulative Effects (Visual)

The area analyzed for cumulative visual effects is the Bankhead National Forest as described in the Affected Environment part of this section.

After statehood the southeastern mixed forest province of what is now the Bankhead National Forest was first reduced by many small subsistence farms. After the failure of many of these farms, much the area was returned to forest with an emphasis placed on loblolly pine. Although loblolly was an effective protector of watersheds and an able supplier of boards and fiber it proved not to be so successful at defending SPB attacks when growing in less than favorable conditions.

Southern pine beetles have devastated considerable acres of the Bankhead National Forest since the early 1990s, particularly loblolly pine stands. Significant parts of the canopy have opened as a result of these attacks. Groups of tall, gray, defoliated stems, generally varying in size from less than an acre to major openings litter the Bankhead. Some of these openings are quite large.

The landscape character of the areas proposed for each action alternative is natural appearing with a few acres of rural forested in the developed recreation areas. Thinning will result in natural appearing land staying natural appearing, and rural forested land staying rural forested of course with a few less trees. Restoration work will force the SPB spots to move into a rational recovery mode immediately, which will speed the change to a healthy forest. Allowing natural processes to create the healing in the SPB spots is expected to take much longer.

All the action alternatives are designed to improve the ecological health of the Bankhead National Forest; therefore, all the action alternatives should result in better visual settings.

Negative visual effects should be expected during and after the proposed activities. Visual healing in the SPB areas could take several seasons for most to be satisfied with the result.

Some will determine this project's visual effects to be significant, some will decide them to be major, some will conclude they are minor, and others will state there is nothing negative at all about these proposed activities. However, one can say that this project will not change the landscape character of the Bankhead National Forest and it will have no long-term negative effect on the scenic integrity of the Bankhead National Forest.

3.7.5 Monitoring

Forest Landscape Architect will approve, review, and report on all vegetative management activities before, during, and after their occurrence in Sipsey River corridor.

Forest Landscape Architect will approve, review, and report on all vegetative management activities before, during, and after their occurrence in developed recreation sites.

Forest Landscape Architect will approve, review, and report on a typical restoration activity before, during, and after their occurrence in a roadside retention and partial retention area.

Forest Landscape Architect will approve, review, and report on a typical thinning activity before, during, and after their occurrence in a roadside retention and partial retention area.

Forest Landscape Architect will approve, review, and report on a typical vegetative management activity before, during, and after its occurrence along the Owl Creek Trail System.

3.8 Recreation Resources

3.8.1 Issues

The major issue related to recreation on the forest was:

- Impacts on recreational experiences and cultural values on the district.

This section will focus on the impacts to recreational experiences on the forest. For this analysis the discussion will be separated into the following three parts:

- What impact would this proposal have on dispersed recreation uses?
- What impact would this proposal have on hunting?
- What impact would this proposal have on trails and trail users?

3.8.2 Affected Environment

There are a variety of recreation resources on the Bankhead National Forest; these resources are described in the Appendix. The resources affected by this proposal are the general forest area where dispersed recreation occurs, the Black Warrior Wildlife Management Area which is a popular hunting area, forest roads used for scenic driving, and the Owl Creek non-motorized trail system. The remaining recreation resources are not affected by this proposal.

Hunting

The general forest area of the Bankhead is used by hunters pursuing turkey, white-tailed deer, squirrels, rabbits, bob-white quail, raccoons and wild hogs. State regulations control seasons, bag limits and methods. Hunters use archery, firearms, primitive firearms and dogs in various seasons. Management of vegetation is the primary tool for improving hunting opportunities.

Black Warrior Wildlife Management Area

This area (WMA), located in the heart of the Bankhead National Forest, is a favorite with hunters. The 97,642 acres within the WMA are managed cooperatively by the USDA Forest Service and the Alabama Department of Conservation and Natural Resources Division of Wildlife and Freshwater Fisheries. The Sipsey Wilderness (25,852 acres) lies within the WMA. Regulations governing hunting are different from the remainder of the national forest and counties. The primary species hunted are white-tailed deer and eastern wild turkey. In the 2002-2003 season, 4,411 hunter days were registered for the deer hunts and 130 deer were harvested. Fifty-one (51) turkeys were harvested with 672 hunter days recorded for the 2003 spring season.

Owl Creek Non-Motorized Trails

There are three inter-connected loops that provide 24.9 miles of non-motorized trail use in the northern part of the Bankhead National Forest (Area 1). These trails are open to hikers, horse riders and mountain bikers. These trails are reached through the Owl Creek Horse Camp and the Pinetorch Trailhead. The Owl Creek Horse Camp has a toilet (SST) and hitch racks. A waterline grant and cooperative project with Lawrence County is expected to provide water to the camp by 2004. This trail network is located in Area 1.

3.8.3 Environmental Effects

Alternative 1

With this alternative, densely forested communities would most likely continue to experience insect and disease mortality. Areas of dead trees and areas where dead trees have been cut would slowly increase in shrub and tree species.

These areas are generally avoided by dispersed recreation visitors because of negative visual qualities, difficulty in access, and hazardous snag conditions.

These areas may improve early successional forage for some wildlife species and nearby hunting, but hunters generally avoid these areas because of limited visibility, difficulty in access, and hazardous snag conditions.

Trails would be periodically blocked as these trees die and fall across them. Trail visitor experience would decline as the visual quality declines in these areas and as they encounter fallen trees across trails. Maintenance costs would rise to clear these fallen trees from trails. Riding around fallen trees would cause a slight increase in damage to areas adjacent to trails.

Alternative 2

This alternative proposes 18,143 acres of thinning and 7,382 acres of restoration. In general, these actions would improve access in localized areas, reduce some hazardous snag conditions, and reduce potential insect and disease mortality and their subsequent impacts (dead stands of trees). This alternative has the most acreage involved in actions; therefore, it would be very beneficial to dispersed recreation, hunting and trail use.

Thinning would create favorable conditions for dispersed recreation (on a short term basis) because most recreation visitors enjoy open, park-like areas. Reforestation of SPB areas would replace some areas of dead trees with new forests, both native pines and hardwoods. With time, these new forests would enhance recreation scenic values. As specific areas are thinned or planted, access would be improved through removal of dense pine stands and dead or fallen trees. These areas would also be safer for forest visitors. Long term reduction of insect and disease mortality would minimize future impacts from large patches of dead trees.

Thinning would create favorable conditions for trail users (on a short term basis). Most riders and hikers enjoy the same open, park-like areas as general recreation users. As described above, these actions would improve the scenic values in specific areas, some of which are adjacent to the Owl Creek non-motorized trails. In addition to this positive change, restoration actions would remove standing and fallen dead trees near some trails, making a safer experience for trail users. Thinning would create a healthier forest with reduced mortality from insect and disease, and there would be fewer patches of dead trees along the trails in the future. Maintenance costs would be reduced as fewer trees die and fall across trails.

These actions would create favorable conditions for some wildlife, especially turkey, bob-white quail, and white-tailed deer. Open park-like stands would create favorable habitat for these three wildlife species and would enhance hunting experiences.

Alternatives 3, 5 & 6

With these alternatives, there are 9,452 acres of proposed thinning and 6,860 acres of restoration (940 acres to be planted). In general, these actions would improve access in localized areas, reduce hazardous snag conditions, and reduce potential insect and disease mortality and their subsequent impacts (dead stands of trees).

Thinning would create favorable conditions for dispersed recreation (on a short term basis) because most recreation visitors enjoy open, park-like areas. Reforestation of SPB areas would also replace some areas of dead trees with new forests, both native pines and hardwoods. With time, these new forests would enhance recreation scenic values. As specific areas are thinned or planted, access would be improved through removal of dense pine stands and dead or fallen trees. These areas would also be safer for forest visitors. Long term reduction of insect and disease mortality would minimize future impacts from large patches of dead trees.

Thinning would create favorable conditions for trail users (on a short term basis), because most riders and hikers enjoy the same open, park-like areas as general recreation users. As described above, these actions would improve the scenic values in specific areas, some of which are adjacent to the Owl Creek non-motorized trails. In addition to this positive change, restoration actions would remove standing and fallen dead trees near some trails, making a safer experience for trail users. Thinning would create a healthier forest with reduced mortality from insect and disease and there would be fewer patches of dead trees along the trails in the future. Maintenance costs would be reduced as fewer trees die and fall across trails.

These actions would create favorable conditions for some wildlife, especially turkey, bob white quail, and white-tailed deer. Open park-like stands would create favorable habitat for these three wildlife species and would enhance hunting experiences.

Alternative 5 adds oak woodlands as a DFC in Area 1 (on 8,115 acres). These woodlands provide the best park-like setting enjoyed by most recreation visitors, including trail users and hunters. The location of these proposed woodland communities is near the Owl Creek non-motorized trails, which is very favorable for trail users. Increased wildlife use of these areas would be enjoyed by trail users as well as hunters. This alternative is the most favorable to dispersed recreation, hunting, and trail use.

Alternative 4

This alternative is similar to Alternatives 3, 5 & 6, however, there would be no shortleaf pine restoration and the only woodlands DFC would be in Area 3. There are 8,627 acres of proposed thinning and 6,833 acres of restoration. In general, these actions would improve the general forest scenic values, improve access in localized areas, reduce some hazardous snag conditions, and reduce potential insect and disease mortality (in the future) and their subsequent impacts (dead stands of trees). Thinning and restoration alone provide open, park-like conditions only for the short term.

Thinning would create favorable conditions (on a short term basis) for dispersed recreation because most recreation visitors enjoy open, park-like areas. Reforestation of SPB areas would replace some areas of dead trees with new forests, both native pines and hardwoods. This alternative would create fewer woodland communities (park-like settings) than Alternatives 3, 5 & 6. As specific areas are thinned or planted, access would be improved through removal of dense pine stands and dead or fallen trees. These areas would be safer for forest visitors. Long term reduction of insect and disease mortality would minimize future impacts from large patches of dead trees.

Thinning would create favorable conditions (on a short term basis) for trail users, because most riders and hikers enjoy the same open, park-like areas as general recreation users. As described above, these actions would improve the scenic values in specific areas (on a short term basis), some of which are adjacent to the Owl Creek non-motorized trails. In addition to this positive change, restoration actions would remove standing and fallen dead trees near some trails, making a safer experience for trail users. Thinning would create a healthier forest with reduced mortality from insect and disease and there would be fewer patches of dead trees along the trails in the future. Trail maintenance costs would be reduced as fewer trees die and fall across trails.

These actions would create more favorable conditions for some wildlife; especially bob white quail, turkey, and white-tailed deer. Open park-like stands would create favorable habitat for these three wildlife species and would enhance hunting experiences (in Area 3 only). Because this alternative provides less woodland habitat, it would be less favorable for hunting than Alternatives 2, 3, 5, or 6.

The following matrix (Table 3.8.3.A) shows general effects by specific recreation resource.

	Dispersed Recreation	**Hunting**	**Trails**
Alternative 1	Slight decline in quality of experience	Slight decline in quality of experience, slight increase in some huntable populations	Slight decline in quality of experience and trail conditions
Alternative 2	**Next best** increase in quality of experience	**Next best** increase in quality of experience, increase in some huntable populations	**Next best** increase in quality of experience and trail conditions
Alternative 3	Increase in quality of experience	Increase in quality of experience, increase in some huntable populations	Increase in quality of experience and trail conditions
Alternative 4	Increase in quality of experience	Slight increase in quality of experience, slight increase in some huntable populations	Increase in quality of experience and trail conditions
Alternative 5	**Best** increase in quality of experience	**Best** increase in quality of experience, increase in some huntable populations	**Best** increase in quality of experience and trail conditions
Alternative 6	Increase in quality of experience	Increase in quality of experience, increase in some huntable populations	Increase in quality of experience and trail conditions

Table 3.8.3.A - Comparison of Effects on Recreation

3.8.4 Cumulative Effects (Recreation)

The long-term effects of Alternatives 2 through 6 would be beneficial for recreational forest users as described above. As the forest progresses toward the DFC's of all of these alternatives there would be more areas with pleasing visual qualities due to the open park-like conditions. Although each alternative is an improvement over the present conditions some have more improvement than others. Since Alternative 5 creates the most woodland community acres it appears to provide the most increase in visual quality as well as the best opportunity to increase hunter satisfaction for the long term. Alternative 2 would be next, Alternatives 3, 5, and 6 are a close third, and Alternative 4 would be last.

3.8.5 Monitoring

Trends in hunter success can be monitored through harvest data. Population trends can be monitored through wildlife survey data (bird point counts, deer surveys, etc.), and recreation trends can be monitored through visitor use data and visitor participation in recreation programs.

3.9 Heritage Resources

3.9.1 Issues

The major issue related to heritage resources that surfaced during scoping was:

- Impacts on recreational experiences and cultural values on the Bankhead National Forest.

For this analysis the issue will be separated into the following five parts:

- What impacts may result in direct damage to significant historic properties including both prehistoric and historic archaeological sites and structures?
- Will the proposed project cause historic properties to be more vulnerable to natural degradation (such as wildfire impacts or erosion) and effects from visitation (such as compaction, artifact displacement, looting, or vandalism)?
- Which is more beneficial for heritage resources?
    - Alternative 1 (no action): historic properties remain unidentified and undisturbed by treatment activities
    - Alternatives 2-6 (action): data would be gathered through implementation of the Section 106 process (of the National Historic Preservation Act of 1966 as amended in 1992)
- Are there significant differences between action alternatives regarding relative site density and site distribution when comparing treatment locations?
- What measures will be taken to protect these resources, particularly historic properties eligible for the National Register of Historic Places (NRHP)?

3.9.2 Affected Environment

The Bankhead National Forest has a rich variety of heritage resources. The archaeological sites range from prehistoric sites, approximately 10,000 - 500 years old, to mid-twentieth century historic sites. This area is part of the Cumberland Plateau, the tail end of the Appalachians, where narrow ridges with steep drainages characterize the terrain. The archaeological site distribution in the Appalachian Highlands tends to follow similar patterns. The Bankhead Forest is no exception. Most prehistoric upland sites are shallow and located on ridges near streams and stream confluences. They usually date to the Archaic through Woodland periods (8000 B.C. to A.D. 900). The soils were not suitable for larger scale prehistoric agricultural methods that relied on renewable bottomlands. Thus, large late prehistoric sites are scarce except where there are extensive bottomlands.

Prehistoric people occupied many natural rock overhangs. Many prehistorically occupied shelters are multi-component and contain cultural materials deposited in layers representing thousands of years of human activity. This evidence is very fragile. There are remains of ancient hearths, storage pits, work areas, and other activities as well as artifacts, particularly of stone, pottery, bone, and charred botanical material. Careless digging can easily destroy these. Artifacts that are not recorded in context lose much of their meaning. The Bankhead National Forest also has several prehistoric petroglyph sites in rock shelters and on exposed rock outcrops. These rock art sites are extremely rare in the East and are also vulnerable to vandalism.

In the early nineteenth century, when Federal land patents were granted, small farmsteads were established on some ridges though poor soils did not encourage large-scale agriculture. Some bluff shelters were used during the Civil War. It was a time when several area caves were mined for saltpeter. Occasionally evidence of liquor stills is found in the shelters as well as along small drainages, representing the activities of several generations of moon shiners.

When the Forest Service acquired most of the present area of the Bankhead Forest in the 1920’s and 30’s, standing structures, such as houses or barns, were bulldozed to prevent them from being fire hazards. Thus, little remains of these structures except occasional rock piles from chimneys or foundations. Domestic vegetation and evidence of dug wells also remain from old houseplaces. However, the Forest Service filled in most of the wells. There are a number of structures dating to the 1930’s such as bridges, picnic shelters, rock walls, fire towers and camps built by the Civilian Conservation Corps for the Forest Service. There are also several important early transportation routes including the Byler Road, Alabama’s first state subsidized road opened in 1822. Ascertaining the presence and significance of nineteenth century roads is a difficult archaeological undertaking since early roads are dynamic entities.

There are three special study areas on the Bankhead: the proposed Indian Tomb Hollow, Kinlock, and High Town Path Districts. All of the alternatives except Alternative 2 will avoid these areas. Alternative 2 includes 3,304 acres in the High Town Path study area. Proposed ground disturbing activities in this area will be mitigated if Alternative 2 is chosen.

Approximately twenty percent of the proposed treatment areas have been previously inventoried for heritage resources. Based on the 1992 Bankhead overview (Futato and Meyer 1992), Forest Service records, and work done for the forthcoming Bankhead Heritage Management Plan, archaeological site distribution was generally found to be one site per every 40 acres. The majority of the sites are bluff shelters, upland lithic scatters, and early twentieth century house place remains. The physiography and cultural history are similar throughout the entire Bankhead National Forest.

3.9.3 Environmental Effects

Alternative 1 (no action)

With this alternative no damage would be incurred by significant historic properties. However, with Alternative 1, the proposed project areas are unlikely to be inventoried for these resources. There has been little investigation to determine whether inventory or no action is the best method to protect these resources or what percentage of inventory is beneficial to overall heritage management concerns. Since the historic properties will not be systematically identified, looting and vandalism may occur to tese properties. Unrecorded properties will not be monitored and protected.

Alternatives 2-6

Within the individual Alternatives 2-6 there is a similar environmental component; each comprised of higher and lower probability areas for locating unrecorded historic properties. Thus, there is no discernible difference between Alternatives 2-6 regarding overall site location probability. No alternative varies significantly in expected site distribution pattern. However, within Alternative 2 there are 3,304 acres of proposed treatment in the High Town Path Study Area. Local informants have identified this area as culturally significant.

These alternatives have potential to damage significant historic properties on the Bankhead National Forest due to treatments that would disturb the ground or make sites more accessible. However, the proposed treatment areas would be surveyed for heritage resources prior to the beginning of any ground disturbing activity. Survey would begin with a systematic inventory of recorded data, followed by field survey, evaluation, and preservation aimed at the enhancement and protection of significant heritage resources in compliance with Sections 106 and 110 of the National Historic Preservation Act of 1966 as amended through 1992. This process emphasizes integration of heritage resource management concerns with the views of the public, scientific community, interested Native American Tribes, and special interest groups.

Following a meeting with the Alabama State Historic Preservation Office (SHPO) on May 5, 2003, to discuss strategies for effectively identifying and documenting historic properties within a large acreage, five-year program proposed for Alternatives 2-6, the following agreement was formulated to meet Section 106 guidelines. The acreage in each of the Alternatives 2-6, if one of the alternatives is implemented, will be divided into smaller parcels for archaeological evaluation over a five-year period. Each year, beginning with 2004, the survey parcels will consist of several, usually adjacent or nearby treatment areas of 300 to 600 acres in size. Each survey parcel will be considered as a separate archaeological project and will have a separate project report. The reports will go through the Section 106 process individually and no ground disturbing activity will take place on any parcels until Section 106 compliance has been achieved through the SHPO and THPO (Tribal Historic Preservation Office) review process. This process includes the following steps:

- Background research:
    - Review of Forest Service land acquisition records
    - Review of Alabama State Site Files
    - Review of Bankhead National Forest Archaeological Status Atlas
    - Examination of historic, topographic, and soils maps
    - Examination of historic and current aerial photographs
    - Review of National Archaeological Database (NADB) documents
    - Consultation with local informants and Native American Tribal representatives
- Field Survey, analysis, and report preparation:
    - Follow guidelines established by the Alabama Historical Commission Policy for Archaeological Survey and Testing in Alabama (revised January 24, 2002)

Historic properties eligible for or potentially eligible for the NRHP identified by the above methods and through previous archaeological surveys will be flagged for avoidance as “special areas”. Therefore, the proposed project complies with the provisions of the National Historic Preservation Act and with Executive Order 11593.

3.9.4 Cumulative Effects (Heritage)

With the action Alternatives 2-6, more sites will be identified and evaluated than were previously recognized. There will also be more site disturbance than with the no action Alternative 1. No long-term substantive studies on the Bankhead Forest have been conducted to determine whether sites have been degraded or disturbed as a result of treatments similar to those in the proposed project. However, since significant historic properties will be avoided there is little likelihood of adverse affects.

3.9.5 Monitoring

Historic properties that are potentially eligible, eligible, or listed on the NRHP will be flagged for avoidance as part of the archaeological survey process. A Forest Service contract inspector or sale administrator will monitor these sites to insure that no damage occurs during treatment activities.

Historic properties are vulnerable to damage by looting or vandalism and by natural disasters such as floods or tornadoes. Forest Service archaeologists, in conjunction with law enforcement, should systematically monitor potentially eligible, eligible, and listed NRHP historic properties according to an established monitoring plan that takes into account factors such as degree of vulnerability and relative significance.

3.10 Economics

The tangible, monetary cost of restoring communities on the Bankhead National Forest would be primarily due to the cost of reforestation (site preparation and planting). Revenue generated from the sale of trees in the thinning areas would mitigate a portion of this cost (Table 3.10.A). The trees to be sold are pulpwood and small sawtimber, and therefore will not generate much revenue. The intangible benefits to the ecosystem are described in the preceding sections of this document, and include:

- Restoring natural community types to the Bankhead.
- Providing for fire dependant communities that would not exist otherwise.
- Enhancing the health of existing loblolly stands.

This project was not proposed with the intentions of making a profit for the Forest Service or keeping timber flowing to local mills, but to restore natural community types to the Bankhead National Forest. Value of the trees to be removed is an influencing factor when considering the economics of the project, and the effects are displayed in the table below (see Table 3.10.A).

Items	Unit	Alt. 1	Alt 2	Alt. 3 & 5	Alt. 4	Alt. 6
Estimated Volume	CCF	0	108,585	75,616	69,016	75,616
Value	$	0	2,177,160	1,928,208	1,759,908	983,008
Contract Thinning	$	0	-	-	-	2,363,000
Restoration Costs	$	0	3,526,620	2,652,070	2,171,260	2,652,070
10% Roads and Trails	$	0	217,716	192,821	175,991	98,301
.25/CCF for NFF	$	0	27,146	18,904	17,254	18,904
Remaining	$	0	(1,594,322)	(935,587)	(604,597)	(4,149,267)

Table 3.10 - Comparison of Effects on Economic Resources

Hiking, backpacking, trail riding, and hunting of various game animals is a major activity in the project area and thus, plays a vital economic role in the community through purchases of hunting licenses, hunting supplies (weapons, ammunition, clothing, etc.), fuel, food, and lodging. The economic impact of these activities is difficult to determine and will not be analyzed here.

Alternative 1

The major effect for this alternative would be that no decision would be made for the DFC's for the forest and loblolly pine stands would continue to be at high risk of SPB infestations. The economic effect of this alternative would be that no revenue would be generated for the U.S. Treasury from the sale of trees and recreational activities may be negatively affected as the quality of recreational experiences continues to decline.

Alternatives 2, 3, 4, 5, and 6

The primary direct economic effect of timber harvesting is the infusion of wood products, which help to enhance the local economy. Revenue is generated for local economies through production of raw products and when manufactured and re-sold as finished products. Most of the trees that would be removed by the project would be of low value. However, the economy is enhanced by the jobs and money derived from the manufacture of the raw materials into finished products, and the sales of these finished products at wholesale outlets and retail stores.

This project would constitute a majority of the planned annual sales program of the Bankhead National Forest for the next five-year period. Based on local volume projections, the annual harvest would be as follows:

- Alternative 2 — 20,000 – 22,000 CCF (hundred cubic feet)
- Alternatives 3, 5, and 6 — 15,000 – 16,000 CCF
- Alternative 4 — 13,000 – 14,000 CCF

Cost/Benefit for each alternative for thinning and restoration of SPB spots would be as follows:

- Alternative 2 — (1,594,322) or (318,864) per year
- Alternatives 3 and 5 — (935,587) or (187,117) per year
- Alternative 4 — (604,597) or (120,919) per year
- Alternative 6 — (4,149,267) or (829,853) per year

Any deficit would have to be made up by appropriated dollars from Congress, partnerships or a combination of the two. There are no economic incentives to harvest timber, but there is a real ecological responsibility to restore the ecosystem on the Bankhead to the desired future condition. This project would not enrich the Forest Service or supplement the timber industry. However, it would start the process of restoring the forest to a desired future condition and, in the short term, maintain the health of existing stands of loblolly pine. The primary economic decision is: Are the costs of this restoration work justified by the purpose of and need for action.

Managing for long-term benefits while having an initial cost investment is not uncommon. For instance, when the Bankhead National Forest was acquired, there was a substantial cost to reforest and control erosion on the cutover tracts of land. To this day, land is typically acquired in a cutover state, and Forest Service management begins with the costs of erosion control and reforestation. There would be long term benefits to the land only after the initial investment is made. Other examples include our prescribed burning efforts and other projects such as recreation. All of these have tangible costs associated with intangible short- and long-term benefits to people and the environment.

This five-year proposal is only part of the long-term goal to restore the Bankhead to the desired future conditions. This proposal covers only the first five years and is the least cost effective period due to the initial cost of site preparation and/or planting of the stands that have been devastated by SPB.

Challenge-cost share money from cooperators would be sought in order to supplement appropriated dollars needed for the project. Assistance from grants and/or partnerships may be a possibility.

Economic benefits are expected to outweigh expenses as the process of reaching desired conditions continues into the future. As the forest matures the trees in healthy stands would continue to grow and increase in size and value. As the forest continues the transition toward DFC's this increased value could be used to offset more of the costs associated with any future projects.

Short-term Uses and Long-term Productivity

Short-term uses are those expected to occur over the next ten years. These uses include, but are not limited to, timber harvest and silvicultural activities. Long-term productivity refers to the capability of the land to provide resource outputs for a period of time beyond the next ten years. Soil and water are the primary resource factors supporting long-term productivity. Federal regulations (36 CFR 219.27) provide for the maintenance of long-term productivity of the land. By law, the Forest Service must ensure that land allocations and permitted activities do not significantly impair the long-term productivity of the land. All of the alternatives considered in detail incorporate the concept of sustained resource output yield while maintaining the productivity of natural resources. Specific direction and mitigation measures included in Chapter 2 would ensure that long-term productivity would not be impaired by the application of the proposed short-term management practices. Although all of the alternatives were designed to maintain long-term productivity, there are differences among alternatives in the long-term availability or condition of resources. There may also be differences among alternatives in long-term expenditures necessary to maintain desired conditions. Alternatives 2, 3, 4, 5, and 6 have the highest inherent level of short-term uses as reflected by the acres of vegetation treatments and potential ground disturbance. These alternatives would therefore be expected to result in higher levels of short-term consequences such as visual impacts, alteration of fish and wildlife habitat, and increased sedimentation.

Alternative 1 has the lowest level of short-term uses, however, there is not necessarily an inverse relationship between the extent and intensity of short-term uses to long-term productivity. Some short-term uses may have substantial short-term adverse impacts but long-term benefits. For example, measures and means of increasing forest health would be expected to have temporary adverse impacts on some resources but long-term benefits to overall forest and watershed health. These types of differences among the alternatives are further described in the preceding Environmental Effects discussions (Chapter 3) covering the various resource areas (air, water, wildlife, recreation, etc.).

Unavoidable Adverse Effects

The application of standards and guidelines, best management practices, monitoring, and adaptive management would limit the extent, severity, and duration of any adverse environmental effects. Mitigation measures are discussed in Chapter 2 of this document. Nevertheless, some adverse effects are unavoidable under any of the alternatives.

Most unavoidable adverse effects are transitory. For example, air quality would diminish on a recurring but temporary basis due to the use of prescribed fire. Although standards and guides require burning during times of greatest smoke dispersion, the presence of smoke and haze could detract from visitor's expectations of clean air. Some impacts to the visual qualities of the Forest landscape may be inevitable. Other short-term unavoidable adverse effects could include sediment production and run-off from fires, silvicultural practices, or temporary road. Standards and guides, best management practices, and monitoring plans would minimize and mitigate adverse affects, however, it is currently not technically feasible to avoid all sediment mobilization. Unavoidable adverse affects could translate into a small, but never the less detectable, reduction in downstream water quality and aquatic habitat loss.

Likewise, disturbance, displacement, or loss of fish and wildlife habitat may occur as a consequence of habitat reduction or increased human activity. Human access and resulting adverse impacts on natural communities is generally increasing and yet unavoidable, regardless of the selected alternative. Silvicultural treatments could have an adverse effect on the potential for future management of un-roaded areas as wilderness, research, or natural areas. Disease, pests, and storm damage will occur at one time or another, creating changes in the appearance and function of the landscape. Such adverse affects may be localized and could be of either temporary or long-term duration. For detailed disclosure of all effects, including unavoidable adverse effects, see the preceding Environmental Effects discussions (Chapter 3) covering the various resource areas (air, water, wildlife, recreation, etc.).

Irreversible and Irretrievable Commitments of Resources

Irreversible commitments of resources are those that cannot be regained, such as the extinction of a species or the removal of mined ore. Irretrievable commitments are those that are lost for a period of time such as the temporary loss of timber productivity in forested areas that are kept clear for use as a power line rights-of-way or road.

There will be no new roads constructed and temporary roads will be revegetated following completion of the proposed activity. Soil movement from some of the proposed activities may be considered irreversible commitments, however mitigation measures and proper project design will minimize this impact. A full discussion of effects to soils can be found in section 3.3.3.

Other Required Disclosures

This proposed project has been coordinated with the State Historic Preservation Officer and a plan of action agreed on to insure that section 106 of the National Historic Preservation Act will be followed and completed prior to ground disturbing activities.

U.S. Fish and Wildlife Service has been involved with this project through scoping and informal consultation during development of the alternatives. A Biological Assessment that addresses potential impacts to threatened and endangered species will be submitted to the U.S. Fish and Wildlife Service along with the EIS.

This project does not require consultation with the National Marine Fisheries Service.

CHAPTER 4. CONSULTATION AND COORDINATION

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References

Albright, Ray and Kevin Leftwich. 1999. A Watershed Analysis for the National Forests in Alabama.

Alexander, G. R.; Hansen, E. A. 1986. Sand bed load in a brook trout stream. N. Am. J. Fish. Manage. 6:9-23.

American Foresters Society. Position Paper T/E species AFS Policy Statement #10: *Protection of Threatened and Endangered Aquatic Species*

Angermeier, P.L. 1995. Ecological attributes of extinction-prone species: loss of freshwater fishes of Virginia. Conserv. Biol. 9:143-158.

Bailey, M. 1989. A Survey for Potential Small Stream Habitat of the Flattened Musk Turtle in Bankhead National Forest. Alabama Natural Heritage Division of the Alabama Department of Conservation and Natural Resources, Montgomery, Alabama.

Baskin, J. and C. Baskin. 1986. Distribution and Geographic/Evolutionary Relationships of Cedar Glade Endemics in Southeastern United States. Castanea 33:138-154.

Baskin, J., C. Baskin, and E. Chester. 1994. The Big Barrens Region of Kentucky and Tennessee: Further Observations and Considerations. Castanea 59:214-225.

Belt, G.H., J. O'Laughlin and T. Merril. 1992. Design of Forest Riparian Buffer Strips for the Protection of Water Quality: Analysis of Scientific Literature. Idaho Forest, Wildlife and Range Policy Analysis Group. Report No. 8 Univ. of Idaho, Moscow, ID. 35pp.

Boggess, W.R., P.A. Swarthout and E.R. Toole. Results of the Survey on the Littleleaf Disease of Southern Pines in Alabama (A Preliminary Report). Alabama Polytechnic Institute, Agricultural Experiment Station, Auburn, AL. 15 pp.

Boschung, H. and M. Mettee. 1974. A Report on the Fishes of the National Forests of Alabama. University of Alabama, Tuscaloosa, Alabama.

Boyer, William D. Longleaf Pine Regeneration and Management: An Overstory Overview. In Kush, John S., Comp. Proceedings of the Longleaf Pine Ecosystem Restoration Symposium, presented at the Society of Ecological Restoration 9th Annual International Conference – Ecological Restoration and Regional Strategies. 1997 November 12-15. Longleaf Alliance Report No. 3. Fort Lauderdale, FL. pp 14-19.

Boyer, William D. and James H. Miller. 1994. Effect of burning and brush treatments on nutrient and soil physical properties in young longleaf pine stands. Forest Ecology and Management 70 (1994) 311-318.

Brown, Charles J. and C. Phillip Weatherspoon. 1990. Sustaining site productivity on forestlands: a user's guide to good soil management. Division of Agriculture and Natural Resources; University of California. Publication 21481: 13-18.

Brown, Charles J. and D. Binkley. 1994. Effect of Management on Water Quality in North American Forests. USDA For. Serv. Gen. Tech. Report RM-248.

Bukenhofer, George A., Joseph C. Neal and Warren G. Montague. 2001. Renewal and Recover: Shortleaf Pine/Bluestem Grass Ecosystem and Red-cockaded Woodpeckers. http://www.fs.fed.us/conf/rcw. 5pp.

Bureau of Chemistry and Soils. 1937. Soil Survey of Winston County, Alabama. 31p.

Burr, B. M., and R. L. Mayden. 1992. Phylogenetics and North American freshwater fishes. Pages 18-75 *in* R . L . Mayden, ed. Systematics, historical ecology, and North American freshwater fishes. Stanford University Press, Stanford, CA.

Castro, J. and F. Reckendorf. 1995. Resource Conservation Assessment, III. Effects of Sediment on the Aquatic Environment: Potential NRCS Actions to Improve Aquatic Habitat Working Paper No. 6. USDA Natural Resources Conservation Service. Oregon State University, Department of Geosciences.

Clingenpeel, J.A. Sediment Yields and Cumulative Effects for Water Quality and Assoicated Beneficial Uses. Process paper for Forest Plan revisions. USDA Forest Service, Ouachita National Forest, Hot Springs, Arkansas.

Coats, R. N.; Miller, T. O. 1981. Cumulative silvicultural impacts on watershed: A hydrologic and regulatory dilemma. Environ. Manage. 5:147-160.

Cowell, C. 1998. Historical Change in Vegetation and Disturbance on the Georgia Piedmont. Am.Midl.Nat. 140:78-89.

Davis, M.L. 2003. 2002 Stream IBI Report. Alabama Department of Environmental Management, Montgomery, Alabama.

DeSelm, H. and N. Murdock. 1993. Grass-dominated Communities, In: Biodiversity of the Southeastern United States: upland terrestrial communities. Martin, W.H., S. Boyce, and A. Echternacht. Eds. John Wiley and Sons, New York.

Dickson, J.G. (ed.) 1992. The Wild Turkey Biology and Management. Stackpole Books, Mechanicsburg, Pennsylvania.

Dissmeyer, G. E.; Foster, G. R. 1984. A Guide for Predicting Sheet and Rill Erosion on Forest Land. USDA-Forest Service, Southern Region. Technical Publication R8-TP6. 40 pages.

Dissmeyer, G. E.; Stump, R. F. 1978. Predicted Erosion Rates for Forest Management Activities in the Southeast. U. S. Department of Agriculture. Forest Service. State and Private Forestry, Southeastern Area. Atlanta GA. 39 pages.

Dodd, C.K. Jr, K.M. Enge, and J.N. Stuart. 1988. Aspects of the biology of the flattened musk turtle, Sternotherus depressus in northern Alabama. Bulletin of Florida State Museum, Biol. Sci. 34(1): 1-64.

Dycus, D.L. 1972. The Freshwater Fishes of Bankhead National Forest in Alabama. Samford University, Birmingham, Alabama.

Elliot, W. J., Hall, D. E., and D. L. Scheele. December, 1999. WEPP:Road (Draft 12/1999) WEPP Interface for Predicting Forest Road Runoff, Erosion and Sediment Delivery. U. S. Department of Agriculture, U. S. Forest Service, Rocky Mountain Research Station and San Dimas Technology and Development Center, Moscow, Idaho.

EPA, 2002. Current and Revised Standards for Ozone and Particulate Matter, (www.epa.gov/oar/oaqps/ozpmbro/current.htm). Environmental Protection Agency, Washington, D.C. (2002).

EPA, 2003. Webpage: AirData. (www.epa.gov/air/data). Environmental Protection Agency, Washington, D.C. (2003).

Ernst, J.P. and V. Brown. 1988. Conserving endangered species on southern forested wetlands. Pages 135-145 in D. Hook and R. Lea, eds. Proceedings of the Symposium: The Forested Wetlands of the United States. USDA Forest Service Gen. Tech. Rep. SE-50. Asheville, NC. 168 pp.

Ewel, K.C. 1990. Swamps. Chapter 9 in: Ecosystems of Florida. R.L. Myers and J.J. Ewel, eds. Univ. of Central FL Press. Orlando.

Feminella, J.W. 2000. Stream Mayflies, Stoneflies and Caddisflies : Do They Care About Controlled Burning in the Forest? in Proceedings: Workshop on Fire, People and the Central Hardwoods Landscape. U.S. Forest Service Northeastern Research Station. General Technical Report NE-274.

Florida Forestry Information. Site Preparation. http://www.sfrc.ufl.edu/Extension/ffws/sp.htm.

Flynn, K. 2002. Forest Practices and Water Quality: Guidelines for Landowners. Circular ANR – 1031. Alabama Cooperative Extension System, Auburn University, Auburn, Alabama.

Frost, C., J. Walker, and B. Peet. 1986. Fire-Dependent Savannas and Prairies of the Southeast: Original Extent, Preservation Status, and Management Problems. In: D. Kulhavy and R.N. Conner, eds. Wilderness and natural areas in the eastern United States: a management challenge. Center for Applied Studies, School of Forestry, S.A.F University, Nacogdoches, TX.

Frost, C. 1998. Presettlement Fire Regimes of the United States. IN L. Brennan, ed. Fire in Ecosystem Management: Shifting the Paradigm from Suppression to Prescription. Proceedings of the Tall Timbers Fire Ecology Conference. No. 20. Tall Timbers Research Station, Tallahassee, Florida.

Futato, Eugene M. and Catherine C. Meyer 1992. William B. Bankhead National Forest: A Cultural Resource Overview. University of Alabama, Alabama Museum of Natural History Division of Archaeology Report of Investigations 67.

Golden, M.S., C.L. Tuttle, J.S. Hush and J.M. Bradley, III. 1984. Forest Activities and Water Quality in Alabama. AL Agric. Exp. Stn. Bulletin No. 555. 87p.

Graney, D. [In preparation]. An old-growth definition for dry-mesic oak forests. [To be printed as a General Technical Report]. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southern Research Station.

Greenberg, C.H.; McLeod, D.E.; Loftis, D.L. [In preparation]. An old-growth definition for western mesophytic and mixed mesophytic forests. [To be printed as a General Technical Report]. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southern Research Station.

Grier, Charles C., Katherine M. Lee, Nalini M. Nadkarni, , Glen O. Klock, and Paul J. Edgerton. 1989. Productivity of Forests of the United States and Its Relation to Soil Site Factors and Management Practices; A Review. U.S.D.A. Forest Service, Pacific Northwest Research Station, General Technical Report PNW-GTR-222 51p.

Haag, W.R. and M. Warren, Jr. 1997. Host fishes and reproduction of six freshwater mussel species from the Mobile Basin, USA. USDA Forest Service, Southern Research Station, Forest Hydrology Laboratory, Oxford, Mississippi.

Hamel, P.B. 1992. Land Manager's Guide to the Birds of the South. The Nature Conservancy, Chapel Hill, North Carolina *and* USDA Forest Service, Atlanta, Georgia.

Harris, S.C., P. O'Neil, and P.Lago. 1991. Caddisflies of Alabama. Bulletin # 142. Geological Survey of Alabama. Tuscaloosa, Alabama.

Haywood, James D. Effects of Seasonal Burning on Herbaceous and Woody Vegetation of a Longleaf Pine-Bluestem Site.

Hess, Nolan J., Alex C. Mangini, Dale A. Starkey and Ronald C. Kertz. 1990. Evaluation of Mortality in Unthinned Loblolly Plantation on the Bankhead Ranger District. USDA Forest Service, Forest Pest Management. Report 90-2-13. 16 pp.

Jorgensen, J.R. and C.S. Hodges, Jr. 1971. Effects of prescribed burning on the microbial characteristics of soil. In: Proceedings of a Symposium; 1971 April 14-16; Charleston, S.C. USDA For. Ser. Southeastern Forest Experiment Station, Asheville, N.C. 1971: 68-76.

Judy, R.D., P.N. Seeley, T.M. Murray, S.C. Svirsky, M.R. Whitworth, and L.S. Ischinger. 1984. 1982 National Fisheries Survey. Vol. I Technical Report: Initial findings. USFWS FWS/OBS-84/06. 140 pp.

Kennamer, J.E. 1997. "After the Fire." *National Wild Turkey Federation, Turkey Call Magazine* 24/2: 75.

Kleinschmidt Associates and Alabama Power Company. 2000. Initial Information Package for the Lewis Smith and Bankhead Developments, FERC No. 2165.

Knutson, K.L. and V.L. Naef. 1997. Management recommendations for Washington's priority habitats: riparian. Wash. Dept. Fish and Wildl., Olympia. 181 pp.

Kopaska-Merkel, David C. and James D. Moore. 2000. Water in Alabama. Circular 122O. Geological Survey of Alabama.

Kucheler Type Fire Ecology and Management: Southern Mixed Forest. 2000. http://svinet2.fs.fed.us/database. 3 pp.

Kucheler Type Fire Ecology and Management: Oak-Hickory Forest. 2000. http://svinet2.fs.fed.us/database. 6 pp.

Landers, J.L.; Boyer, W.D. [In preparation]. An old-growth definition for upland longleaf and south Florida slash pine forests, woodlands, and savannas. [To be printed as a General Technical Report]. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southern Research Station.

Leopold, A. 1949. A Sand County Almanac, and Round River. New York: Oxford University Press. 226 p.

Lubchenco, J.A., and 15 coauthors. 1991. The sustainable biosphere initiative: an ecological research agenda. Ecology 72:371-412.

Martin, W.H., S. Boyce, and A. Echternacht. Eds. 1993. Biodiversity of the southeastern United States: upland terrestrial communities. John Wiley and Sons, New York.

Masters, R., C. Wilson, G. Bukenhoffer, and M. Payton. 1996. "Effects of pine-grassland restoration for red-cockaded woodpeckers on white-tailed deer forage production." *The Wildlife Society Bulletin* 24(1):77.

Masters, R., R. Lochmiller, S. McMurry and G. Bukenhoffer. 1998. "Small Mammal Response to Pine-Grassland Restoration for Red-Cockaded Woodpeckers." *The Wildlife Society Bulletin* 26(1):148.

McKee, Jr. W.H., G. E. Hatchell and A. E. Tiarks. 1985. Managing site damage from logging. USDA For. Ser. Southeastern Experiment Station Gen. Tech. Report SE-32. 21p.

McDougal, L., K.M. Russel, and K.N. Leftwich. 2001. A Conservation Assessment of Freshwater Fauna and Habitat in the Southern National Forests, USDA Forest Service, Southern Region, Atlanta, Georgia.

McGregor,S. 1992. A Mussel Survey of the Streams draining Bankhead National Forest and the Oakmulgee Division of the Talladega National Forest, Alabama. Geological Survey of Alabama, Tuscaloosa, Alabama.

McKinney, M.L. and J.L. Lockwood. 2001. Biotic homogenization: a sequential and selective process. Pp. 1-17 *in* J.L. Lockwood and M.L.McKinney, eds. Biotic homogenization. Kluwer Plenum/Academic Press, New York.

McMahon, C.K., D.J. Tomczak and R.M. Jeffers. 1998. Longleaf Pine Ecosystem Restoration: The Role of the USDA Forest Service. In Kush, John S., Comp. Proceedings of the Longleaf Pine Ecosystem Restoration Symposium, presented at the Society of Ecological Restoration 9th Annual International Conference – Ecological Restoration and Regional Strategies. 1997 November 12-15. Longleaf Alliance Report No. 3. Fort Lauderdale, FL. pp 20-31.

Mettee, M.F., P. O'Neil, and J.M. Pierson. 1996. Fishes of Alabama and The Mobile Basin. Oxmoor House, Birmingham, Alabama.

Michael, J.L. and D.G. Neary. 1993. Herbicide Dissipation Studies in Southern Forest Ecosystems. Enviro. Toxi. Chem. 12:405-410.

Miller, James A. 1990. Ground Water Atlas of the United States. Segment 6. Hydrologic Investigations Atlas 730-G. U.S. Geological Survey.

Mistretta, Paul A., Dale A. Starkey and Stephen A. Covington. 1983. Hazard Rating and Management of Annosus Root Rot on the Bankhead National Forest. USDA Forest Service, Forest Pest Management. Report 83-2-18. 33 pp.

Murphy, P.; Nowacki, G.J. [In preparation]. An old-growth definition for xeric pine and pine-oak forests and woodlands. [To be printed as a General Technical Report]. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southern Research Station.

National Academy of Science. 1970. Land Use and Wildlife Resources. Washington D.C.

Natural Resources Conservation Service. 1997. Natural Resources Inventory: 1997 Highlights of Alabama. http://www.al.nrcs.usda.gov/technical/nri/97 highlights.htm.

NWCG. Prescribed Fire Smoke Management Guide. National Wildfire Coordinating Group. U.S. Bureau of Land Management, Boise Interagency Fire Center, Boise, ID. (1985).

North Carolina Commission for Health Services, Division of Environmental Health. 2000. Report on the Proper Maintenance of Septic Tank Systems in Accordance with Section 13.5 of HB 1160 (Clean Water Act of 1999). North Carolina Department of Environment and Natural Resources.

Neary, D.G., P.B. Bush and J.L. Michael. 1993. Fate, Dissipation and Environmental Effects of Pesticides in Southern Forests: A Review of a Decade of Research Progress. Enviro. Toxi. Chem. 12: 411-428.

Nicolo, Mike. 1982. Analysis of the Management Situation. National Forests in Alabama. Land & Resource Management Plan.

Nowacki, G.J. 1993. Final project report: the development of old-growth definitions for the Eastern United States, Phase II [Unpublished report]. On file with: 1720 Peachtree Rd, Atlanta, GA 30367: U.S. Department of Agriculture, Forest Service, Southern Region. 218 p.

O'Laughlin, Jay and Philip S. Cook. 2003. Inventory-Based Forest Health Indicators: Implications for National Forest Management. Journal of Forestry. 101(2):11-17.

Personal Conversation with LaWayne Robinson, District Conservationist, USDA Natural Resources Conservation Service.

Primack, R. 1993. Essentials of Conservation Biology. Sinauer Associates Inc. Sunderland, MA.

Pritchett W. L. and Richard E. Fisher. 1979. Properties and Management of Forest Soils. John Wiley and Sons. 500p.

Ralston, Charles W. and Glyndon E. Hatchell. 1971. Effects of prescribed burning on physical properties of soil. In: Proceedings of a Symposium; 1971 April 14-16; Charelston, S.C. USDA For. Ser. Southeastern Experiment Station, Asheville, N.C. 1971: 76-84

Ricciardi, A., and J.B. Rasmussen. 1999. Extinction rates of North American freshwater fauna. Conserv. Biol. 13:1220-1222.

Rickman, D. and Luval, J. 1996. Soils and Streams: Hydrology in the William B. Bankhead National Forest. JLL DCR Consulting.

Roehl, J. W. 1962. Sediment source areas, delivery ratios, and influencing morphological factors. IASH Comm of Land Eros, Pub 59:202-213.

SAMAB. Southern Appalachian Assessment. USDA - Forest Service, Atlanta, GA. (1996).

SAMI. Final Report. Southern Appalachian Mountains Initiative, Asheville, NC. (2002).

Schafale, M. and A. Weakley. 1990. Classification of the Natural Communities of North Carolina – Third Approximation. NC Natural Heritage Program Division of Parks and Recreation, NC Dept. of Environment, Health, and Natural Resources.

Scharf, F.S., F. Juanes, and M. Sutherland. 1998. Inferring ecological relationships from the edges of scatter diagrams: comparison of regression techniques. Ecology 79:448-468.

Scott, M.C., and G.S. Helfman. 2001. Native invasions, homogenization, and the mismeasure of integrity of fish assemblages. Fisheries 26(11):6-15.

Shalaee, A.K., W.L. Nutter, E.R. Burroughs, Jr. and L.A. Morris. 1991. Runoff and Sediment Production from Burned Forest Sites in the Georgia Piedmont. Water Resources Bulletin. 27(3):485-493.

Stone, Jr., Earl L. 1971. Effects of prescribed burning on long-term productivity of coastal plain soils. In: Proceedings of a Symposium; 1971 April 14-16; Charleston, S.C. USDA For. Ser. Southeastern Experiment Station, Asheville, N.C. 1971: 115-127

Stone, W.E. 2000. Habitat Relationships of breeding birds in the Bankhead National Forest. Alabama A& M University, Normal, Alabama.

Terrell, J.W., B.S. Cade, J. Carpenter, and J.M. Thompson. 1996. Modeling stream fish habitat limitations from wedge-shaped patterns of variation in standing stock. Transactions of the American Fisheries Society 125:104-117.

Tiner, R.W. 1999. Restoring Wetland and Streamside/Riparian Buffers: An Introduction. US Fish and Wildlife Service, Hadley, MA.

Tyrrell [and others]. [In preparation]. [Title unknown - definitions for old-growth communities in the Eastern Region - R-9]. [To be printed as a General Technical Report]. St Paul. MN: U.S. Department of Agriculture, Forest Service, North Central Forest Experiment Station.

Ursic, S.J. 1991. Hydrologic Effects of Clearcutting and Stripcutting Loblolly Pine in the Coastal Plain. Water Resources Bulletin 27(6):925-937.

USDA Forest Service. 1989. Final Environmental Impact Statement Vegetation Management in the Appalachian Mountains. Volume 1. 89-91

USDA National Forests in Alabama. 1988, 1993, 1994. Watershed Monitoring Reports On File at Supervisor's Office.

USDA Soil Conservation Service. 1959. Soil Survey of Lawrence County, Alabama. 83p.

USDA For. Ser. Southeastern Experiment Station, Asheville, N.C. 1971: 86-89

USDA Forest Service. 2003. Draft Environmental Impact Statement for the Revised Land and Resource Management Plan, National Forests in Alabama.

USDA Forest Service. 1996. The Southern Appalachian Assessment. Atlanta, Georgia.

USDA Forest Service. 1990. Silvics of North America. Volume I, Conifers. Agriculture Handbook 654. 675 pp.

USDA Forest Service. 1990. Silvics of North America. Volume II, Hardwoods. Agriculture Handbook 654. 877 pp.

USDA Forest Service. 2000. Proceedings: Workshop on Fire, People and the Central Hardwoods Landscape; 2000 March 12-14; Richmond, VA. Northeastern Research Station. GTR NE-274. 129 pp.

USDA Forest Service. 1988. How to Identify and Control Littleleaf Disease. Southern Region. R8-PR 12. 14 pp.

USDA Forest Service. 1953. Campbell, W.A., Otis L. Copeland, Jr. and George H. Hepling. Managing Shortleaf Pine in Littleleaf Disease Areas. Southeastern Forest Experiment Station, Asheville, NC. Station Paper No. 25. 12 pp.

USDA Forest Service. 1940. Siggers, Paul V. and K. D. Doak. The Littleleaf Disease of Shortleaf Pines. Southern Forest Experiment Station, New Orleans, LA. Occasional Paper No. 95.

USDA Forest Service. 2001. Stanturf, John A., Dale W. Wade, Thomas A. Waldrop, Deborah K. Kennard and Gary L. Achtemeier. Background Paper: Fire in Southern Forest Landscapes. Southern Forest Resource Assessment. Southern Research Station. 43 pp.

USDA Forest Service. 2003. Draft Environmental Impact Statement for the Revised Land and Resource Management Plan, National Forests in Alabama.

USDA Forest Service. 1996. The Southern Appalachian Assessment. Atlanta, Georgia.

USDA Forest Service. December 1995. Landscape Aesthetics, A Handbook for Scenery Management. Agriculture Handbook Number 701.

U.S. Department of Agriculture Forest Service. 1997. Guidance for Conserving and Restoring Old-Growth Forest Communities on National Forests in the Southern Region. Report of the Region 8 Old-Growth Team. Southern Region. Atlanta, GA. 119 p.

USDI Fish and Wildlife Service. 1991. Swamp Pink (Helonias bullata) Recovery Plan. Newton Corner, Mass. 56 pp.

USFS. Southern Forestry Smoke Management Guidebook. USDA Forest Service, Southern Forest Experiment Station, Asheville, NC. (1976).

USFS. (Draft) Revised Land and Resource Plan – National Forests in Alabama and (Draft) Environmental Impact Statement. USDA – Forest Service, Montgomery, AL. (2003, currently in public review).

USDI Fish and Wildlife Service. 2000. Mobile River Basin Aquatic Ecosystem Recovery Plan. Atlanta, Ga. 128 pp.

Valkenberry, H. 2003. Alabama Agricultural Statistics Service. www.acesag.auburn.edu/dept/nass.

Van Lear, D.H., G.B. Taylor, and W.F. Hanson. 1995. Sedimentation in the Chattooga River watershed. Technical Paper 19. Department of Forest Resources, Clemson University, Clemson, South Carolina.

Van Lear, D.H. and Waldrop, T.A. 1989. History, Uses, and Effects of Fire in the Appalachians. General Technical Report SE-54. U.S. Department of Agriculture, Forest Service, Southeastern Forest Experiment Station.

Waldrop, T.A., White, D.L. and Jones S.M. 1992. Fire regimes for pine-grassland communities in the southeastern United States. Forest Ecology and Management, 47:195-210.

Warren, M.L. Jr., and B.M. Burr. 1994. Status of freshwater fishes of the United States: Overview of an imperiled fauna. Fisheries 19(1):6-17.

Warren, M.L. Jr., B.M. Burr, S.J. Walsh, H.L. Bart Jr., R.C. Cashner, D.A. Etnier, B.J. Freeman, B.R. Kuhajda, R.L. Mayden, H.W. Robison, S.T. Ross, and W.C. Starnes. 2000. Diversity, distribution, and conservation status of the native freshwater fishes of the southern United States. Fisheries 25(10):7-31.

Waters, T.F. 1995. Sediment in streams: sources, biological effects, and control. American Fisheries Society Monograph 7.

Wells, C.G. 1971. Effects of prescribed burning on soil chemical properties and nutrient availability. In: Proceedings of a Symposium; 1971 April 14-16; Charleston, S.C.

Weakley, A., K. Patterson, S. Landaal, M. Pyne, and others, compilers. 1998. International Classification of Ecological Communities: Terrestrial Vegetation of the Southeastern United States – Working Draft. The Nature Conservancy Southeast Regional Office, Southern Conservation Science Department, and Natural Heritage Programs of the Southeastern United States.

Wharton, C.H. 1978. The Natural Environments of Georgia. Georgia Dept. of Nat. Res. Bull. 114. Atlanta, Georgia. 218 pp.

White, D.L.; Lloyd, F.T. [In preparation]. An old-growth definition for dry and dry-mesic oak-pine forests. [To be printed as a General Technical Report]. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southern Research Station. 63 p.

Wilson, L.A. 1995. Land Manager's Guide to the Amphibians and Reptiles of the South. The Nature Conservancy, Chapel Hill, North Carolina *and* USDA Forest Service, Atlanta, Georgia.

Wilson, L.A. 1995. The Land Manager's Guide to Amphibians and Reptiles of the South. The Nature Conservancy, Southeastern Region, Chapel Hill North Carolina.

Wilson, L.M. 1999. Biological Opinion On the Impacts of Forest Management and Other Activities to Indiana and Gray Bats on National Forests in Alabama. USDI Fish and Wildlife Service, Ecological Services Field Office, Daphne, Alabama.

Yahner, R. 1988. Changes in wildlife communities near edges. Conserv. Biol. 2:333-339.

York, Harlan H. 1959. Littleleaf of Southern Pine. Alabama Department of Conservation, Division of Forestry. 119 pp.

____. 1973. Impact of Soil Compaction on the Long Term Productivity of Piedmont and Atlantic Coastal Plain Soils. Report FS-6200-7. 26p.

____. Hewlett, Lull, Reinhart, et al. 1977. The Impact of Timber Harvest on Soils and Water. Reprinted from the Report of the President's Advisory on Timber and the Environment – April 1073. 40p.

USDA Forest Service. 2002. Southern Appalachian Forest Planning Terrestrial and Aquatic Teams: Habitat Association Reports. www.southernregion.fs.fed.us/planning/sap/sap-teams.shtm including:

> Huber, F., D. Kirk, and M. Donahue. 2001. Conservation and Management of Forest Riparian Habitat Associates. 32 pp.
>
> McDonald, J. 2000. Management and Conservation Strategies for Seeps and Springs Habitat Associates. Chattahoochee-Oconee National Forests. 10 pp.
>
> McDonald, J. 2000. Management and Conservation Strategies for Southern Yellow Pine Associates. Chattahoochee-Oconee National Forests. 29 pp.
>
> McDonald, J. 2000. Mid- and Late- Successional Deciduous Forest Associates. Chattahoochee-Oconee National Forests. 13 pp.
>
> Mitchell, L. 1999. Conservation and Management of Forest Interior/Area Sensitive Mid-Late Successional Deciduous Forest. Cherokee National Forest. 18 pp.
>
> Mitchell, L. and C. Wentworth. 1999. Conservation and Management of Rock Outcrop and Cliff Associates in the Southern Appalachians. Cherokee National Forest & Chattahoochee-Oconee National Forests. 13 pp.
>
> Mitchell, L. 1999. Conservation and Management of Karst and Cave Associates. Cherokee National Forest. 11 pp.

Peters, G.M. 1999. Management and Conservation Strategies for Habitat Association #20 – Shrub/Seedling/Sapling Species. Francis Marion & Sumter National Forests. 7 pp.

Peters, G.M. 1998. Management and Conservation Strategies for Habitat Association #8 – Grass/Forb Species. Francis Marion & Sumter National Forests. 11 pp.

Roecker, R. and C. Wentworth. Mixed Mesic Forests. Francis Marion & Sumter National Forests and Chattahoochee National Forest. 6 pp.

Roecker, R. Glades, Prairies, Savannas, and Woodlands. Francis Marion & Sumter National Forests. 5 pp.

Wenworth, J. 1999. Management and Conservation Strategies for Habitat Association #12 – Habitat Generalist Species. Chattahoochee-Oconee National Forests. 12 pp.

Wenworth, J. 2000. Management and Conservation Strategies for Habitat Association #19 – Mixed Xeric Species. Chattahoochee-Oconee National Forests. 9 pp.

Wenworth, C. 2000. Conservation and Management of Bog Habitat Associates. Chattahoochee-Oconee National Forests. 9 pp.

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Deputy Director, USDA APHIS, PPD/EAD, Riverdale, MD
Natural Resources Conservation Service, National Environmental Coordinator, U.S. Department of Agriculture, Washington, DC
USDA, National Agricultural Library, Acquisitions & Serials Branch, Beltsville, MD
BLM Eastern States Office, Springfield, VA
U.S. Army Engr. South Atlantic Division, Atlanta, GA
U.S. Navy, Office of Chief of Navy Operations, Washington, DC
Naval Oceanography Division, U.S. Naval Observatory, Washington, DC
Director, Office of Envir. Compliance, U.S. Department of Energy, Washington, DC
Region IV Environmental Protection Agency, EIS Review Coordinator, Atlanta, GA
Environmental Review Division, HUD Building, Washington, DC
HUD CPD Division Director, Birmingham, AL
HUD Field Environmental Officer, Atlanta, GA
Office of Environmental Policy and Compliance, U.S. Dept. of the Interior, Washington, DC
Southeast Region, National Park Service, Atlanta, GA

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GLOSSARY

Basal area (BA) - the area, in square feet, of the cross section of a single tree, or all of the trees in a stand, measured at 4.5 feet above ground, usually expressed as square feet per acre.

Biodiversity - the variety of life in an area, including the variety of genes, species, plant and animal communities, and ecosystems, as well as the interactions of these elements.

Desired Future Condition – the land or resource conditions that are expected to result if goals and objectives are fully achieved.

Diameter of breast height (d.b.h.) - the standard method for measuring tree diameter at 4 1/2 feet from the ground.

Continuous inventory of stand conditions (CISC) - the USDA Forest Service, Southern Region's forest stand database containing descriptive and prescriptive data about mapped stands of forest land.

Early seral (successional) stage - the stage of a young forest prior to the development of overstory and midstory canopies. The age of trees is usually less than 20 years depending on the composition of tree species. This stage provides grass, forb, and shrub components.

Ecological classification system (ECS) - a hierarchical system used in classifying ecological types and ecological units for making comparisons. The system is ecologically based and integrates existing data about site conditions, such as climate, topography, geology, soil, hydrology, and vegetation. It includes four planning and analysis scales of ecological units (from largest to smallest): ecoregion, subregion, landscape, and land unit. These ecological units are then subdivided as follows: ecoregion - domain, division, and province; subregion - section and subsection; landscape - landtype association; and land unit - landtype, landtype phase, and site.

Even-aged - a stand of trees which originated at a single point in time, so that the individual trees are approximately the same age or a regeneration system designed to produce such a stand.

Forb – a broad leaf plant that has little or no woody material in it.

Forests - an area of trees with overlapping crowns (generally forming a 60 to 100 percent cover).

Habitat - the physical and biological environment for a plant or animal in which all the essentials for its development, existence, and reproduction are present.

HTP - High Town Path Special Study Area.

ITH - Indian Tomb Special Study Area.

KRS - Kinlock Rock Shelter Special Study Area.

Late seral (successional) stage - the stage of forest development during which the age of trees is usually greater than 80 years depending on the composition of tree species. Small gaps become more common as some trees die allowing full sunlight to reach the mid- and understories. This stage contains the largest trees within a forest and provides the highest capability for large snags, large live cavities, and den tree production. The presence of large, downed, woody material is highest during this period. Old-growth forests occur during the later periods of the seral stage.

Mesic - pertaining to or adapted to an area that has a balanced supply of water; neither wet nor dry.

Mid seral (successional) stage - the stage of forest development during which distinct overstory, midstory, and understory canopies are present. The age of trees range from about 20 years to about 90 years depending on the composition of tree species. The trees are usually greater than 10 inches in D.B.H. This stage provides capability for hard mast production, large standing snags, and live cavities. During this period, tree species reach economic maturity.

Natural plant community - an association of plant species which are endemic to an area and whose characteristics have not been adversely affected by human disturbance.

Old-growth forests - an ecosystem distinguished by old trees and related structural attributes. Old growth encompasses the later stages of stand development that typically differ from earlier stages in a variety of characteristics including tree size, accumulation of large dead woody material, number of canopy layers, species composition, and ecosystem function. Old growth is not necessarily virgin or primeval. It can develop over time following human disturbances, just as it does following natural disturbances. Old growth encompasses both older forests dominated by early seral species and forests in later successional stages dominated by shade tolerant species.

Rare community - an association of plant and animal species which occurs only on a very small portion of the overall ecosystem.

Savannas - an open area with trees covering less than 25 percent and with herbaceous species dominating.

Seral stage - a developmental, transitory stage in the ecological succession of a biotic community.

Terrestrial - of, or pertaining to, land as distinct from water.

Thinning – a type of cut used to remove some of the trees in a stand.

Woodlands - an open stand of trees with crowns not usually touching (generally forming a 25 to 60 percent cover).

Xeric - characterized by a lack of moisture.

APPENDICES

Forest Community Types Native to the Bankhead National Forest

The Forest Health and Restoration Project for the Bankhead National Forest proposes a future forest landscape aimed at sustaining a representation of forest community types and all associated plant and wildlife species, that are native to the Southern Cumberland Plateau region. This conservative approach was first described by Aldo Leopold (1949) as "keeping all the pieces." The desired condition recognizes the Cumberland Plateau primarily as a deciduous forest landscape, with a smaller representation of fire-dependent pine and oak woodland conditions. Emphasis would be placed on maintaining forest and plant community types not abundant on private lands. This future landscape also includes a representation of old-growth forests for all native forest community types, high quality aquatic habitats, intact riparian forests, and the conservation of key rare community types such as rock outcrop and cliff areas, forest glades, and caves.

These community types, adapted by Southern Appalachian planners, are based on the old-growth community types (USDA Forest Service, 1996) and are as follows:

- Mixed Mesophytic Forest
- Dry-Mesic (somewhat moist sites) Oak Forest
- Dry to Dry-Mesic Oak-Pine Forest
- Dry and Xeric (very dry sites) Oak Forest and Woodland
- Xeric Pine (Shortleaf) and Pine-Oak Forest and Woodland
- Upland Longleaf Pine/Bluestem Woodland

These forest community types are described below.

Mixed Mesophytic and Western Mesophytic Forest Community Description

Western mesophytic forests are found in provinces in western portions of the Southeast and the mixed mesophytic forests can be found primarily in the southern Appalachians (table 1). Western mesophytic forests occur on a wide range of topographic positions, including drier sites than mixed mesophytic forests, which occur on lower north- and east-facing slopes and mesic coves up to an elevation of about 5,000 feet. In less mountainous terrain, they may cover the entire landscape where conditions are suitable.

Western mesophytic forests are typically dominated by oaks, but also include many of the species of the mixed mesophytic forests, which are among the most biologically diverse ecosystems of the United States. Species dominance patterns vary with geographic location and site condition, such as topographic features, moisture, and fertility.

Of 25 to 30 characteristic species the following are the most common: sugar maple (Acer saccharum), beech (Fagus grandifolia), hemlock (Tsuga canadensis), silverbell (Halesia carolina), yellow poplar (Liriodendron tulipfera), red maple (A. rubrum), white oak (Quercus alba), northern red oak (Q. rubra), yellow birch (Betula alleghaniensis), yellow buckeye (Aesculus flava), and basswood (Tilia americana) (table 2). Yellow buckeye and basswood are indicator species for the mixed mesophytic forests, but yellow buckeye is absent from western mesophytic forests. The age structure of the old growth is broadly uneven aged or all aged. Irregular distributions are common and reflect severe natural disturbances or irregularities in seed production (Greenberg and others, in preparation.

Disturbance

The creation of relatively small canopy gaps from the death of a group of trees is the driving "background" disturbance and accounts for a relatively constant turnover of trees and species in mixed mesophytic forests. Estimates of canopy turnover rates vary from less than 0.4 to 1.0 percent annually. Less frequent, large-scale disturbances such as severe windstorms, ice storms, floods, landslides, fire, damage by native or non-native insects, or fungal infections may also create openings. The shade tolerance of different species (as well as the initial composition of species and their regeneration strategies) influence tree regeneration in relation to the size and age of the gap.

Example of a Mixed Mesophtic Forest Community

Dry-Mesic Oak Forest Community Description

Dry-mesic oak forests occur throughout the South in all ecological provinces (table 3), most commonly in the mountains. They are usually found on dry, upland sites on southern and western aspects and ridgetops (Nowacki 1993).

The species composition of this forest type varies greatly due to its wide distribution. The major species include chestnut oak (Quercus montana), northern red oak (Q. rubra), black oak (Q. velutina), white oak (Q. alba), and scarlet oak (Q. coccinea). Additional associates include southern red oak (Q. falcata), post oak (Q. stellata), blackjack oak (Q. marilandica), pignut hickory (Carya glabra), mockernut hickory (C. tomentosa), and red maple (Acer rubrum) (table 4). Coniferous species such as shortleaf pine (Pinus echinata), eastern white pine (P. strobus), and table mountain pine (P. pungens) may occur as a mixture, with an overstory coverage of less than 25 percent. American chestnut (Castanea dentata) was a major species in this forest community type up until the 1930's (Nowacki 1993).

The scarlet oak and chestnut oak stands (national forest [CISC] forest types 52, 59, and 60) associated with dry-xeric conditions are included in the dry and xeric oak forests, woodlands, and savanna community type.

Disturbance

The frequency of fire is important in the disturbance regime for this community type. The dry sites on which this community type occurs are conducive to recurring, low-intensity surface fires thought to have been quite common prior to European settlement. These fires helped maintain the oak component by eliminating fire-sensitive competitors and stimulating oak regeneration (Nowacki 1993). Furthermore, blowdowns of single or multiple trees result in gap phase regeneration, and infrequent tornadoes can destroy an entire stand. Other important disturbances for this community type include oak decline, infestations by gypsy moths, and ice storm damage.

Example of a Dry-Mesic Oak Forest Community

Dry and Dry-Mesic Oak-Pine Forest Community Description

Dry and dry-mesic oak-pine forests constitute a large part of the eastern deciduous forest, extending from southern Missouri and east Texas in the west to the Atlantic coast from New Jersey to north Florida (table 5). Most of these forests occur on coarse-textured soils on ridges and south-facing slopes in the mountains and droughty uplands in the Piedmont and Coastal Plain (White and Lloyd, in preparation). The oak-pine forest community type consists of least 20 percent of the basal area in pine and at least 20 percent in oak.

The dry and dry-mesic oak-pine and dry-mesic oak forest community types may develop on the same type of sites depending on type and intensity of disturbances. Across the east, shortleaf pine (Pinus echinata) and white oak (Quercus alba) are the most common canopy species, whereas pitch pine (P. rigida), scarlet oak (Q. coccinea) and chestnut oak (Q. prinus) are more common in mountainous areas. Other common canopy species include Virginia pine (P. virginiana), table mountain pine (P. pungens), post oak (Q. stellata), blackjack oak (Q. marilandica) on dry sites and loblolly pine (P. taeda), southern red oak (Q. falcata), black oak (Q. velutina), mockernut hickory (Carya tomentosa), pignut hickory (C. glabra), and red maple (Acer rubrum) on dry-mesic sites (table 6). Ericaceous species, such as blueberry (Vaccinium spp.), huckleberry (Gaylusaccia spp.), and mountain laurel (Kalmia latifolia), typically dominate the shrub layer, while dogwood (Cornus florida), sourwood (Oxydendrum arboreum), sassafras (Sassafras albidum), and blackgum (Nyssa sylvatica) are common in the midstory. Common understory and vine species include sedges (Carex spp.), panicum grasses (Panicum spp.), broom sedge (Andropogon spp.) and other grasses, pipsessewa (Chimaphila maculata), begger's ticks (Desmodium spp.), bracken fern (Pteridium spp.), greenbriar (Smilax spp.)., Virginia creeper (Parthenocissus quinquefolia), and grapes (Vitis spp.). Currently a lower frequency of fires is resulting in species composition changes.

Disturbance

The dry and dry-mesic oak-pine forest community type is transitory on a given site. Historically, fire, aboriginal activities, windfall, natural mortality, and other disturbances maintained this forest community type. Disturbances vary across its range, with lightning fires prevalent in the Coastal Plain and Ozark Mountains, hurricanes in the Coastal Plain, and tornadoes in the Ouachita and Ozark Mountains. Fire is less frequent in the Appalachian Piedmont and Mountains. The frequency of natural fires is estimated at between 5 and 32 years throughout the Southeast (White and Lloyd, in preparation). Beyond a certain gap size (0.1 acre in the Piedmont), fire (or other forest floor disturbance) is the limiting factor for maintaining this forest community type.

Example of a Dry and Dry-Mesic Oak-Pine Forest Community

Dry and Xeric Oak Forest, Woodland, and Savanna Community Description

Dry and xeric oak forests, woodlands, and savannas are found throughout the southeast in all ecological provinces. They usually occur on very dry and infertile uplands (table 7). They also occur on steep, south-facing slopes or rock outcrops. Soils are usually coarse textured, and dry soil conditions may prevail most of the year (Tyrrell and others, in preparation).

Two recognized subtypes occur in the South: the "widespread" subtype and the southern subtype. The southern subtype is associated primarily with longleaf (Pinus palustrus) or slash pine (P. elliottii) communities in the Coastal Plain and oak barrens located in the western portion of region. The southern subtype community is made up of small-statured trees that include turkey oak (Quercus laevis), bluejack oak (Q. incana), sand post oak (Q. margaretta), Mohr's oak (Q. mohriana), and sand live oak (Q. geminata). Larger trees such as live oak (Q. virginiana) may also be present (table 8).

The "wide spread" subtype includes black oak (Quercus veltina), post oak (Q. stellata), blackjack oak (Q. marilandica), chestnut oak (Q. montana), scarlet oak (Q. coccinea), and white oak (Q. alba) as the major species (Nowacki 1993).

Disturbance

Periodic surface fires are important for maintaining the open condition of this forest community type. Fires are thought to have burned frequently enough to restrict tree density and promote the growth of shade intolerant grasses, forbs, and shrubs (Nowacki 1993).

Example of a Dry and Xeric Oak Forest, Woodland, and Savanna Community

Xeric Pine and Pine-Oak Forest and Woodland Community Description

Xeric pine and pine-oak forests and woodlands are found throughout most of the eastern United States, from southern Missouri and northeast Texas east to the Atlantic coastline from southern Maine to South Carolina (table 9). Because this forest community type covers a broad geographic range, there are distinctive differences between the communities separated by the Mississippi River. All principal species discussed below are found in the communities east of the river However, shortleaf pine (Pinus echinata) is the only pine species which occurs west of the river and chestnut oak is confined to the region east of the river. Xeric pine and pine-oak forests and woodlands typically occur on ridgetops and south-facing upper slopes in the mountains or on excessively-drained, sandy uplands in gentler terrain, such as in the Piedmont (Murphy and Nowacki, in preparation).

This forest community type normally exists on strong acidic soils with extreme moisture and nutrient deficiencies. Xeric site conditions may exist due to: (1) low precipitation, (2) limited moisture absorption/retention because of exposed bedrock, steep slopes, coarse-textured soils, rocky soils, or shallow soils, and/or (3) elevated evapotranspiration rates on southern-facing slopes. Principal overstory species of this community type include pitch pine (P. rigida), Virginia pine (P. virginiana), shortleaf pine, eastern white pine (P. strobus), table mountain pine (P. pungens), and chestnut oak (Quercus prinus) (table 10). Associated species include scarlet oak (Q. coccinea), black oak (Q. velutina), blackjack oak (Q. marilandica), post oak (Q. stellata), northern red oak (Q. rubra), southern red oak (Q. falcata), white oak (Q. alba), and pignut hickory (Carya glabra) (Murphy and Nowacki, in preparation).

Disturbance

Due to the prevailing xeric conditions and chemical content (volatile resins and pitch) of most plant species occurring in this community type, these forests and woodlands have historically experienced frequent fires. Most fires were probably low intensity, surface burns since they occurred frequently and did not allow significant amounts of fuel to build up, although occasional fires occurred in some areas that destroyed an entire stand. On sites where moisture and nutrients are not as limiting, periodic fires are required to maintain a dominance of yellow pines, because pine seedlings rarely become established in oak litter. Over many decades, increases in the amount of dead biomass can predispose these forests and woodlands to resource damaging wildfires, especially in older stands that have experienced mortality caused by southern pine beetles. In the absence of fire, successional changes on xeric sites are normally quite restricted. On other sites, succession in the absence of fire leads to a dominance by oaks and/or white pine along with other shade tolerant and fire intolerant species (Murphy and Nowacki, in preparation).

Ice or glaze storms along with strong winds often cause extensive uprooting or blowdown of trees in these stands. These disturbances typically form large light gaps, and the downed biomass increases fuel loads which may lead to high-intensity fires.

Example of a Xeric Pine and Pine-Oak Forest and Woodland Community

Upland Longleaf Pine Forest, Woodland, and Savanna Community Description

The upland longleaf pine forest, woodland, and savanna community type can be found from Virginia south through central Florida and west to east Texas, with extensions into the Appalachian Piedmont and Mountains of north Alabama and northwest Georgia (table 11). On the Coastal plains, this forest community is typically found on sandhills, although in central and south Florida, it occurs on slight rises in flatwoods. In the mountains, it is usually restricted to sites that are apt to burn, specifically ridge tops and middle and upper slopes with south and southwest exposures (Nowacki 1993).

In this forest community type the dominant canopy tree is longleaf pine (Pinus palustris), providing relatively dense to patchy and very open canopies. These communities have frequent transitions in ages, tree sizes, and tree density. Sometimes associated with this forest community type are clusters of deciduous scrub oaks, evergreen scrub oaks, and mesic hardwoods (table 12). The groundcover consists of hundreds of species of herbs and low shrubs sometimes dominated by wiregrass (Aristida stricta and A. beyrichiana) in the eastern portion of its range and by bluestem grasses (Schizachyrium tenerum and S. scoparium) in the western portion (Landers and Boyer, in preparation).

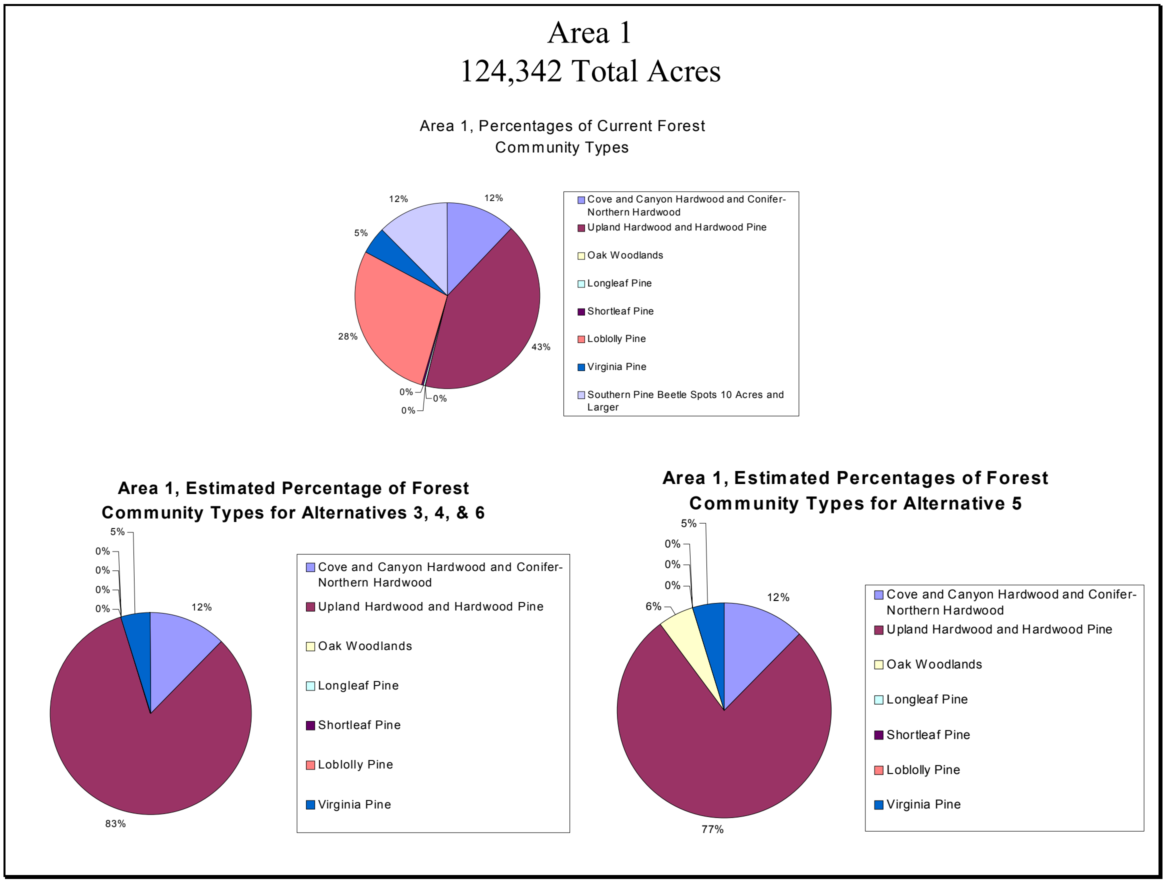
Disturbance

Fires during the growing season are the major disturbances in the upland longleaf and south Florida slash pine communities. In most instances, the frequency of fires associated with maintaining longleaf pine is estimated to be every 2 to 4 years. In the Coastal Plain sandhills and transition areas, the frequency is estimated to be 3 to 10 years. In addition to normal fire regimes, other disturbances include lightening, wind events (e.g., tornadoes, tropical storms, and microbursts), and periodic droughts that result in conditions conducive to intense fires (Landers and Boyer, in preparation).

The following charts show the current percentages by community type as compared to the predicted percentages by community type by Area for the action alternatives.

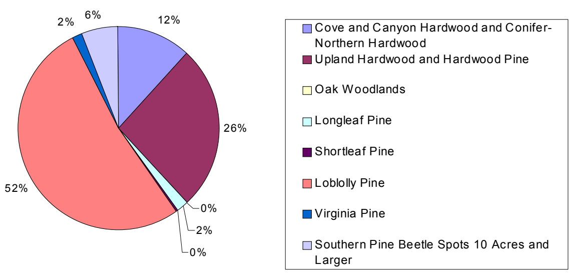
Upland Longleaf Pine Forest, Woodland, and Savanna Community

Comparison of Community Types by Area

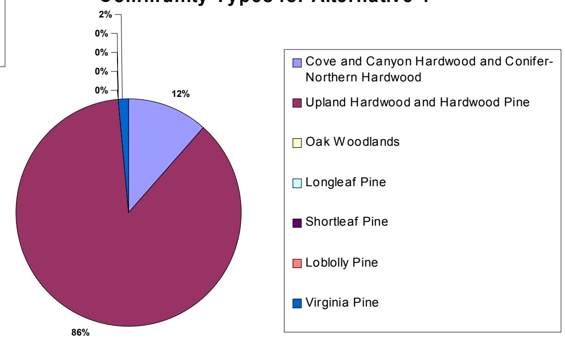


Area 2
34,151 Total Acres

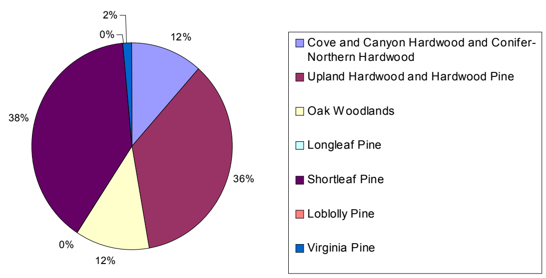
Area 2, Percentages of Current Forest Community Types



Area 2, Estimated Percentage of Forest Community Types for Alternative 4

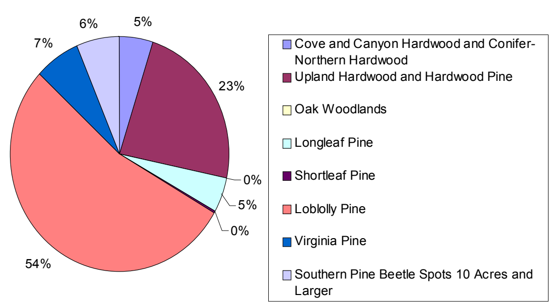


Area 2, Estimated Percentage of Forest Community Types for Alternatives 3, 5, & 6

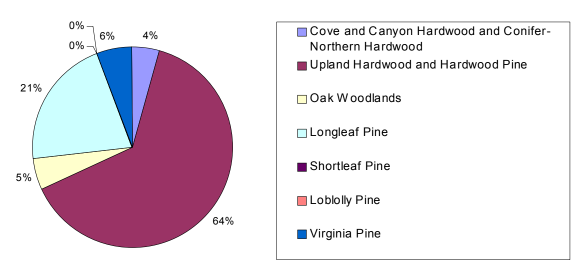


Area 3
23,221 Total Acres

Area 3, Percentages of Current Forest Community Types



Area 3, Estimated Percentage of Forest Community Types for Alternatives 3, 4, 5, & 6



Alternative 2 Proposed Actions List

Alternative 2 Thinning Stands				
Compt.	**Stand**	**Acres**	**DFC**	**Year**
Area 1 Thin				
1	19	19	H	2004
3	11	8	H	2005
3	17	32	H	2005
3	24	23	H	2005
4	1	41	H	2006
4	8	34	H	2006
4	12	40	H	2006
4	14	148	H	2006
4	20	167	H	2006
4	32	37	H	2006
5	1	89	H	2008
5	5	23	H	2008
5	9	56	H	2008
5	16	52	H	2008
5	23	44	H	2008
5	29	19	H	2008
5	30	4	H	2008
5	32	15	H	2008
6	4	35	H	2004
7	2	30	H	2008
7	10	93	H	2008
7	11	33	H	2008
9	2	74	H	2008
9	5	13	H	2008
9	7	26	H	2008
9	11	37	H	2008
9	14	23	H	2008
9	16	58	H	2008
10	2	54	H	2008
10	6	75	H	2008
10	10	38	H	2008
10	11	9	H	2008
10	14	47	H	2008
10	18	75	H	2008
13	18	12	H	2005
13	25	28	H	2005
13	27	33	H	2005
14	12	56	H	2005
14	14	49	H	2005
14	16	41	H	2005
15	3	39	H	2004
15	5	37	H	2004

Alternative 2 Restoration Stands					
Compt.	**Stand**	**Acres**	**DFC**	**Treatment**	**Year**
Area 1 Restore					
5	18	16	H	HT	2005
5	30	11	H	HT	2005
6	13	11	H	HT	2006
7	10	55	H	HT	2005
9	5	76	H	HT-PF	2006
9	11	18	H	HT-PF	2006
10	11	23	H	HT-PF	2006
10	15	32	H	HT-PF	2006
15	13	44	H	HT-PF	2006
15	24	41	H	HT-PF	2006
16	1	34	H	HT	2006
16	10	9	H	HT	2006
18	4	65	H	HT-PF	2007
18	17	10	H	HT-PF	2007
18	19	1	H	HT-PF	2007
22	17	17	H	HT-PF	2005
22	26	33	H	HT-PF	2005
23	6	35	H	HT	2005
23	15	42	H	HT-PF	2005
24	1	13	H	HT-PF	2006
29	3	25	H	HT-PF	2006
36	8	67	H	HT	2005
36	10	32	H	HT	2005
36	14	21	H	HT	2005
37	2	17	H	HT-PF	2005
37	10	11	H	HT-PF	2005
37	13	13	H	HT-PF	2005
37	15	15	H	HT-PF	2005
37	16	23	H	HT-PF	2005
38	1	31	H	HT	2007
38	5	21	H	HT-PF	2007
38	7	46	H	HT-PF	2007
38	11	33	H	HT-PF	2007
39	23	10	H	HT	2007
39	27	27	H	HT	2007
39	29	17	H	HT	2007
39	31	25	H	HT	2007
39	32	22	H	HT	2007
42	12	16	H	HT	2007
42	22	12	H	HT	2007
42	27	13	H	HT	2007
42	33	16	H	HT	2007

Compt.	Stand	Acres	DFC	Year
15	6	18	H	2004
15	8	25	H	2004
15	10	28	H	2004
15	11	45	H	2004
16	1	76	H	2004
16	5	25	H	2004
17	6	54	H	2004
17	13	41	H	2004
18	4	56	H	2005
18	7	28	H	2005
18	11	33	H	2005
18	16	29	H	2005
18	30	2	H	2005
22	9	32	H	2008
22	19	30	H	2008
22	23	50	H	2008
22	27	40	H	2008
22	29	20	H	2008
23	1	25	H	2008
23	2	8	H	2008
23	5	25	H	2008
23	7	21	H	2008
23	15	121	H	2008
24	12	33	H	2008
24	20	8	H	2008
24	21	24	H	2008
29	3	53	H	2005
29	6	37	H	2005
29	7	8	H	2005
29	8	42	H	2005
29	11	76	H	2005
30	2	28	H	2007
30	5	30	H	2007
30	8	33	H	2007
30	14	36	H	2007
30	15	27	H	2007
30	18	35	H	2007
35	23	25	H	2005
36	10	14	H	2007
36	11	13	H	2007
36	14	32	H	2007
37	2	40	H	2007
37	7	30	H	2007
37	9	34	H	2007
37	10	33	H	2007
37	13	23	H	2007

Compt.	Stand	Acres	DFC	Treatment	Year
43	4	70	H	HT-PF	2007
43	6	55	H	HT-PF	2007
45	2	61	H	HT	2007
45	4	49	H	HT	2007
46	3	39	H	HT-PF	2006
46	6	14	H	HT-PF	2006
49	20	31	H	HT	2007
51	8	18	H	HT	2005
51	11	23	H	HT	2005
52	13	10	H	HT	2005
52	27	11	H	HT-PF	2005
53	5	56	H	HT	2008
53	11	29	H	HT	2008
53	13	13	H	HT	2008
54	1	9	H	HT	2008
54	10	32	H	HT	2008
55	6	19	H	HT	2007
55	9	49	H	HT	2007
55	12	19	H	HT	2007
55	14	15	H	HT	2007
55	15	74	H	HT	2007
55	24	12	H	HT	2007
57	9	29	H	HT	2007
57	11	95	H	HT	2007
57	14	56	H	HT	2007
59	4	69	H	HT	2006
59	13	13	H	HT	2006
59	14	54	H	HT	2006
60	1	37	H	HT	2005
60	6	129	H	HT	2005
65	1	23	H	HT	2004
65	3	13	H	HT	2004
65	4	31	H	HT	2004
65	12	20	H	HT	2004
65	13	41	H	HT	2004
65	16	13	H	HT	2004
65	19	18	H	HT	2004
66	2	10	H	HT-PF	2004
66	3	19	H	HT-PF	2004
66	7	73	H	HT-PF	2004
67	6	16	H	HT	2004
67	11	61	H	HT	2004
67	12	34	H	HT	2004
68	6	70	H	HT	2004
68	8	27	H	HT	2004
68	9	80	H	HT	2004

Compt.	Stand	Acres	DFC	Year
38	3	34	H	2005
38	7	29	H	2005
38	11	19	H	2005
39	17	13	H	2006
39	19	8	H	2006
40	2	18	H	2006
40	3	74	H	2006
40	8	39	H	2006
40	10	53	H	2006
40	13	86	H	2006
40	14	76	H	2006
41	8	82	H	2007
41	11	22	H	2007
41	13	42	H	2007
41	15	20	H	2007
41	16	63	H	2007
42	3	13	H	2005
42	9	5	H	2005
42	12	34	H	2005
42	15	2	H	2005
42	21	114	H	2005
42	22	51	H	2005
42	23	9	H	2005
42	25	26	H	2005
42	26	35	H	2005
42	27	1	H	2005
42	29	63	H	2005
43	6	91	H	2005
43	20	50	H	2005
43	24	40	H	2005
44	1	31	H	2007
44	11	30	H	2007
44	12	31	H	2007
44	13	15	H	2007
45	13	41	H	2007
45	17	22	H	2007
46	4	16	H	2007
46	7	83	H	2007
46	14	156	H	2007
47	11	45	H	2007
49	6	28	H	2007
50	2	24	H	2007
50	6	43	H	2007
50	18	25	H	2007
50	26	22	H	2007
51	3	14	H	2007

Compt.	Stand	Acres	DFC	Treatment	Year
68	11	13	H	HT	2004
69	22	105	H	HT	2004
70	10	136	H	HT-PF	2005
70	15	43	H	HT-PF	2005
70	23	41	H	HT-PF	2005
70	28	19	H	HT-PF	2005
76	18	55	H	HT	2005
76	25	11	H	HT	2005
76	26	30	H	HT	2005
77	3	22	H	HT	2006
77	6	12	H	HT	2006
77	12	12	H	HT	2006
81	5	76	H	HT	2006
81	6	21	H	HT	2006
90	10	34	H	HT-PF	2006
90	16	24	H	HT-PF	2006
90	19	21	H	HT-PF	2006
90	20	46	H	HT-PF	2006
90	24	18	H	HT-PF	2006
91	4	12	H	HT	2006
91	6	21	H	HT	2006
92	4	12	H	HT	2006
92	13	61	H	HT	2006
92	24	15	H	HT	2006
93	5	14	H	HT	2006
93	11	21	H	HT	2006
94	1	47	H	HT-PF	2008
94	2	19	H	HT-PF	2008
94	7	35	H	HT	2008
94	11	35	H	HT	2008
95	11	51	H	HT-PF	2008
96	11	11	H	HT	2006
104	7	18	H	HT	2008
116	3	20	H	HT-PF	2004
116	6	13	H	HT-PF	2004
116	7	15	H	HT-PF	2004
117	3	11	H	HT	2008
117	20	102	H	HT	2008
117	25	14	H	HT	2008
117	27	28	H	HT	2008
118	6	23	H	HT-PF	2008
118	11	96	H	HT	2008
118	25	45	H	HT-PF	2008
119	11	42	H	HT	2008
119	16	20	H	HT-PF	2008
119	19	11	H	HT-PF	2008

Compt.	Stand	Acres	DFC	Year
51	8	44	H	2007
51	11	36	H	2007
51	20	93	H	2007
52	10	28	H	2007
52	13	21	H	2007
52	14	9	H	2007
52	16	91	H	2007
52	17	35	H	2007
52	23	23	H	2007
52	27	23	H	2007
52	36	22	H	2007
52	41	22	H	2007
52	42	18	H	2007
53	2	20	H	2007
53	11	87	H	2007
53	13	32	H	2007
54	12	25	H	2008
54	18	20	H	2008
54	20	21	H	2008
54	32	10	H	2008
55	1	14	H	2008
55	6	22	H	2008
55	15	33	H	2008
56	1	170	H	2008
56	5	19	H	2008
56	7	33	H	2008
56	23	152	H	2008
57	10	4	H	2008
58	3	28	H	2006
58	5	12	H	2006
58	8	5	H	2006
58	17	11	H	2006
58	21	4	H	2006
58	23	10	H	2006
58	26	81	H	2006
58	31	26	H	2006
59	15	31	H	2008
59	18	31	H	2008
64	7	285	H	2004
64	12	46	H	2004
65	7	23	H	2004
65	11	32	H	2004
65	13	70	H	2004
66	1	30	H	2007
66	7	110	H	2007
67	3	25	H	2007

Compt.	Stand	Acres	DFC	Treatment	Year
119	21	29	H	HT-PF	2008
134	1	14	H	HT	2008
136	15	58	H	HT	2008
136	19	13	H	HT	2008
137	16	26	H	HT	2008
137	18	43	H	HT	2008
138	1	49	H	HT	2008
138	11	48	H	HT	2008
Area 1 Total		**4669**	*Hardwood*		
		Area 2 Restore			
8	5	5	S	DC-PF-PS	2008
8	7	11	S	DC-PF-PS	2008
8	13	1	S	DC-PF-PS	2008
8	14	8	S	DC-PF-PS	2008
8	22	43	S	DC-PF-PS	2008
8	23	141	S	DC-PF-PS	2008
8	32	54	S	DC-PF-PS	2008
20	5	22	S	DC-PF-PS	2005
20	9	13	S	DC-PF-PS	2005
20	11	3	S	DC-PF-PS	2005
20	27	24	S	DC-PF-PS	2005
21	1	12	S	DC-PF-PS	2004
21	3	96	S	DC-PF-PS	2004
21	4	44	S	DC-PF-PS	2004
21	5	15	S	DC-PF-PS	2004
21	11	41	S	DC-PF-PS	2004
31	14	72	S	DC-PF-PS	2007
32	1	17	S	DC-PF-PS	2006
32	4	47	S	DC-PF-PS	2006
32	6	19	S	DC-PF-PS	2006
32	8	23	S	DC-PF-PS	2006
33	14	11	S	DC-PF-PS	2005
48	1	21	S	DC-PF-PS	2007
48	3	12	S	DC-PF-PS	2007
121	5	35	S	DC-PF-PS	2007
121	18	14	S	DC-PF-PS	2007
124	2	32	S	DC-PF-PS	2006
124	3	16	S	DC-PF-PS	2006
124	4	15	S	DC-PF-PS	2006
124	5	35	S	DC-PF-PS	2006
124	8	41	S	DC-PF-PS	2006
124	11	19	S	DC-PF-PS	2006
124	16	188	S	DC-PF-PS	2006
124	20	49	S	DC-PF-PS	2006
125	15	29	S	DC-PF-PS	2008

Compt.	Stand	Acres	DFC	Year
67	18	15	H	2007
67	24	44	H	2007
68	1	39	H	2004
68	13	42	H	2004
69	4	49	H	2008
69	15	42	H	2008
69	20	44	H	2008
70	1	51	H	2008
70	18	44	H	2008
70	27	43	H	2008
76	27	4	H	2006
76	31	15	H	2006
76	36	22	H	2006
76	48	9	H	2006
76	49	39	H	2006
77	6	41	H	2004
78	2	8	H	2006
78	10	18	H	2006
78	14	136	H	2006
79	5	10	H	2005
79	15	20	H	2005
79	18	11	H	2005
80	2	45	H	2006
80	3	11	H	2006
80	12	37	H	2006
80	13	63	H	2006
80	16	37	H	2006
80	17	30	H	2006
81	17	22	H	2005
90	1	48	H	2008
90	2	11	H	2008
90	7	46	H	2008
90	10	28	H	2008
90	24	25	H	2008
90	34	11	H	2008
90	38	26	H	2008
91	2	67	H	2008
91	4	35	H	2008
91	5	26	H	2008
92	4	45	H	2004
92	9	28	H	2004
92	10	67	H	2004
92	28	76	H	2004
93	4	18	H	2006
93	9	25	H	2006
93	11	24	H	2006

Compt.	Stand	Acres	DFC	Treatment	Year
126	1	17	S	DC-PF-PS	2008
126	3	37	S	DC-PF-PS	2008
126	15	11	S	DC-PF-PS	2008
126	17	10	S	DC-PF-PS	2008
126	19	42	S	DC-PF-PS	2008
127	16	18	S	DC-PF-PS	2005
129	5	9	S	DC-PF-PS	2008
129	15	10	S	DC-PF-PS	2008
130	1	31	S	DC-PF-PS	2008
131	12	10	S	DC-PF-PS	2008
132	3	4	S	DC-PF-PS	2004
132	5	11	S	DC-PF-PS	2004
132	6	37	S	DC-PF-PS	2004
132	7	13	S	DC-PF-PS	2004
132	8	15	S	DC-PF-PS	2004
132	15	13	S	DC-PF-PS	2004
132	17	15	S	DC-PF-PS	2004
133	2	86	S	DC-PF-PS	2006
133	9	46	S	DC-PF-PS	2006
133	17	40	S	DC-PF-PS	2006
139	1	15	S	DC-PF-PS	2007
139	5	31	S	DC-PF-PS	2007
139	6	16	S	DC-PF-PS	2007
139	13	43	S	DC-PF-PS	2007
139	17	11	S	DC-PF-PS	2007
139	19	12	S	DC-PF-PS	2007
139	22	64	S	DC-PF-PS	2007
139	26	22	S	DC-PF-PS	2007
143	21	11	S	DC-PF-PS	2007
Area 2 Total		**1928**	*Shortleaf*		
Area 3 Restore					
148	15	11	L	DC-PF-PL	2005
148	20	36	L	DC-PF-PL	2005
148	22	9	L	DC-PF-PL	2005
148	37	14	L	DC-PF-PL	2005
149	4	5	L	DC-PF-PL	2008
149	5	16	L	DC-PF-PL	2008
149	6	9	L	DC-PF-PL	2008
149	8	10	L	DC-PF-PL	2008
149	10	13	L	DC-PF-PL	2008
149	19	39	L	DC-PF-PL	2008
150	2	5	L	DC-PF-PL	2007
150	4	26	L	DC-PF-PL	2007
150	7	60	L	DC-PF-PL	2007
150	8	3	L	DC-PF-PL	2007

Compt.	Stand	Acres	DFC	Year
93	21	38	H	2006
94	1	4	H	2005
94	7	32	H	2005
94	11	84	H	2005
95	2	38	H	2005
95	7	33	H	2005
95	12	18	H	2005
95	14	71	H	2005
95	16	101	H	2005
95	20	86	H	2005
95	24	29	H	2005
95	35	2	H	2005
101	1	5	H	2008
101	2	30	H	2008
101	7	164	H	2008
102	8	77	H	2007
102	10	62	H	2007
102	14	149	H	2007
102	18	14	H	2007
103	2	16	H	2007
103	17	12	H	2007
104	7	40	H	2008
104	9	46	H	2008
104	11	18	H	2008
105	1	25	H	2007
105	4	118	H	2007
107	2	49	H	2008
116	6	24	H	2005
116	8	80	H	2005
116	9	147	H	2005
116	10	54	H	2005
117	6	9	H	2007
117	7	20	H	2007
117	14	86	H	2007
118	2	23	H	2007
118	5	59	H	2007
118	6	104	H	2007
118	17	65	H	2007
118	19	27	H	2007
118	25	26	H	2007
119	5	20	H	2008
119	16	88	H	2008
136	7	9	H	2008
136	9	5	H	2008
136	13	42	H	2008
136	20	19	H	2008

Compt.	Stand	Acres	DFC	Treatment	Year
150	16	3	L	DC-PF-PL	2007
150	17	5	L	DC-PF-PL	2007
150	19	12	L	DC-PF-PL	2007
150	20	21	L	DC-PF-PL	2007
150	23	6	L	DC-PF-PL	2007
150	24	10	L	DC-PF-PL	2007
150	27	7	L	DC-PF-PL	2007
151	9	16	L	DC-PF-PL	2005
151	10	72	L	DC-PF-PL	2005
151	11	84	L	DC-PF-PL	2005
151	14	8	L	DC-PF-PL	2005
151	16	19	L	DC-PF-PL	2005
151	22	5	L	DC-PF-PL	2005
151	24	5	L	DC-PF-PL	2005
151	33	15	L	DC-PF-PL	2005
151	34	6	L	DC-PF-PL	2005
151	39	32	L	DC-PF-PL	2005
151	49	16	L	DC-PF-PL	2005
151	56	1	L	DC-PF-PL	2005
152	11	17	L	DC-PF-PL	2005
159	1	30	L	DC-PF-PL	2007
159	9	3	L	DC-PF-PL	2007
160	10	15	L	DC-PF-PL	2004
160	25	18	L	DC-PF-PL	2004
160	26	6	L	DC-PF-PL	2004
163	26	14	L	DC-PF-PL	2005
164	7	9	L	DC-PF-PL	2007
164	15	10	L	DC-PF-PL	2007
165	24	11	L	DC-PF-PL	2007
166	9	3	L	DC-PF-PL	2005
166	18	6	L	DC-PF-PL	2005
166	19	6	L	DC-PF-PL	2005
166	20	37	L	DC-PF-PL	2005
166	21	1	L	DC-PF-PL	2005
Area 3 Total		**785**	*Longleaf*		
Total Pine DFC		*2713*			
Total Hdwd DFC		*4669*			
Total Restore		**7382**			

Total Thin		**11102**	*Hardwood*	
Area 2 Thin				
Compt.	**Stand**	**Acres**	**DFC**	**Year**
8	4	30	S	2006
8	5	124	S	2006
8	7	24	S	2006
8	9	50	S	2006
8	12	44	S	2006
8	14	51	S	2006
8	23	59	S	2006
8	32	90	S	2006
19	3	24	S	2005
19	9	29	S	2005
20	4	19	S	2007
20	5	12	S	2007
20	8	19	S	2007
20	9	32	S	2007
20	11	47	S	2007
20	16	27	S	2007
20	18	7	S	2007
20	21	26	S	2007
20	22	32	S	2007
20	27	5	S	2007
21	18	41	S	2008
31	3	102	S	2005
31	4	33	S	2005
31	14	84	S	2005
31	19	55	S	2005
32	1	25	S	2004
32	3	19	S	2004
32	14	33	S	2004
32	15	31	S	2004
32	18	43	S	2004
33	3	44	S	2005
33	10	27	S	2005
33	19	63	S	2005
33	23	55	S	2005
34	3	33	S	2005
34	5	29	S	2005
34	14	37	S	2005
34	22	38	S	2005
121	6	14	S	2007
121	20	13	S	2007
122	2	36	S	2007
122	3	11	S	2007
122	16	25	S	2007

Compt.	Stand	Acres	DFC	Year
122	24	9	S	2007
122	27	20	S	2007
123	6	52	S	2008
124	16	158	S	2004
124	20	78	S	2004
124	21	16	S	2004
125	23	168	S	2006
125	31	91	S	2006
125	38	124	S	2006
125	59	12	S	2006
125	66	38	S	2006
126	5	41	S	2006
126	12	46	S	2006
126	15	88	S	2006
126	21	23	S	2006
126	23	71	S	2006
126	26	34	S	2006
126	30	19	S	2006
126	31	35	S	2006
126	40	88	S	2006
126	49	8	S	2006
127	13	35	S	2007
127	20	30	S	2007
127	21	66	S	2007
127	29	46	S	2007
128	3	32	S	2005
128	10	34	S	2005
128	12	57	S	2005
128	19	46	S	2005
128	33	110	S	2005
129	15	31	S	2007
129	26	53	S	2007
130	1	31	S	2006
130	7	29	S	2006
130	12	57	S	2006
130	14	53	S	2006
130	20	39	S	2006
131	12	27	S	2005
131	16	41	S	2005
132	3	12	S	2005
132	5	29	S	2005
132	10	43	S	2005
132	13	49	S	2005
132	17	15	S	2005
133	17	79	S	2007
139	2	38	S	2008

Compt.	Stand	Acres	DFC	Year
139	18	20	S	2008
139	21	17	S	2008
140	4	34	S	2008
140	9	31	S	2008
140	12	36	S	2008
141	20	53	S	2007
143	9	26	S	2008
143	11	51	S	2008
143	21	22	S	2008
Area 2 Total		**4233**	*Shortleaf*	
Area 3 Thin				
148	6	20	L	2004
148	10	69	L	2004
148	11	20	L	2004
148	12	19	L	2004
148	15	47	L	2004
148	17	70	L	2004
148	23	23	L	2004
148	25	12	L	2004
148	27	52	L	2004
148	28	37	L	2004
148	31	27	L	2004
149	6	26	L	2006
149	7	44	L	2006
150	2	23	L	2006
150	4	85	L	2006
150	7	3	L	2006
150	10	36	L	2006
151	21	32	L	2006
151	24	7	L	2006
151	29	10	L	2006
152	10	30	L	2008
152	25	43	L	2008
152	28	14	L	2008
153	15	10	L	2008
154	3	54	L	2008
154	7	55	L	2008
154	10	68	L	2008
154	11	39	L	2008
154	15	44	L	2008
154	19	30	L	2008
154	23	37	L	2008
157	10	32	L	2004
157	19	19	L	2008
157	22	18	L	2008

Year Column:
Planned Treatment Year

DFC Column:
H = Hardwood
S = Shortleaf
L = Longleaf

Compt.	Stand	Acres	DFC	Year
159	9	22	L	2004
160	10	68	L	2008
160	17	32	L	2008
160	24	54	L	2008
160	26	40	L	2008
160	30	24	L	2008
161	1	8	L	2006
161	2	14	L	2006
161	6	49	L	2006
161	9	101	L	2006
161	15	27	L	2006
161	16	29	L	2006
161	27	42	L	2006
163	20	38	L	2007
163	22	54	L	2007
163	26	32	L	2004
163	30	13	L	2004
163	31	78	L	2007
163	39	27	L	2004
164	4	46	L	2004
164	15	40	L	2004
164	17	83	L	2004
164	20	33	L	2004
164	28	12	L	2004
164	30	14	L	2004
165	20	24	L	2005
165	21	20	L	2005
165	24	49	L	2005
165	25	30	L	2005
166	4	12	L	2005
166	11	12	L	2005
166	23	37	L	2005
166	26	26	L	2005
166	30	144	L	2005
166	31	23	L	2005
166	32	6	L	2005
166	35	13	L	2005
170	29	20	L	2007
170	33	25	L	2007
170	36	23	L	2007
170	49	20	L	2007
171	3	22	L	2007
171	22	47	L	2007
171	25	4	L	2007
171	26	59	L	2007
171	32	18	L	2007

Treatment Column:
DC = Roller Drum Chop
HT = Hand tools
PF = Prescribed Fire
PS = Plant Shortleaf
PL = Plant Longleaf
NT = No Treatment

Compt.	Stand	Acres	DFC	Year
171	34	39	L	2007
Area 3 Total		**2808**	*Longleaf*	
Total Pine DFC		*7041*		
Total Hdwd DFC		*11102*		
Total Thin		**18143**		

Alternative 3, 5, and 6 Proposed Actions List

Compt.	Stand	Acres	DFC	Year
Area 1 Thin				
9	2	74	H	2008
9	5	13	H	2008
9	7	26	H	2008
10	6	75	H	2008
10	10	38	H	2008
10	11	9	H	2008
15	10	28	H	2004
15	11	45	H	2004
16	1	76	H	2004
16	5	25	H	2004
17	13	41	H	2004
18	4	56	H	2005
18	7	28	H	2005
18	11	33	H	2005
22	9	32	H	2008
22	19	30	H	2008
22	23	50	H	2008
22	27	40	H	2008
22	29	20	H	2008
23	15	121	H	2008
24	12	33	H	2008
30	2	28	H	2007
30	8	33	H	2007
30	14	36	H	2007
35	23	25	H	2005
36	14	32	H	2007
37	7	30	H	2007
37	10	33	H	2007
37	13	23	H	2007
38	3	34	H	2005
38	7	29	H	2005
38	11	19	H	2005
43	6	91	H	2005
43	20	50	H	2005
44	1	31	H	2007
44	13	15	H	2007

Compt.	Stand	Acres	DFC	Treatment	Year
Area 1 Restore					
5	18	16	H	HT	2005
5	30	11	H	HT	2005
6	13	11	H	HT	2005
7	10	55	H	HT	2005
9	5	76	H	HT-PF	2006
10	11	23	H	HT-PF	2006
10	15	32	H	HT-PF	2006
15	13	44	H	HT-PF	2006
15	24	41	H	HT-PF	2006
16	1	31	H	HT	2006
18	4	65	H	HT-PF	2007
18	17	10	H	HT-PF	2007
22	17	17	H	HT-PF	2005
22	26	33	H	HT-PF	2005
23	6	35	H	HT	2005
23	15	42	H	HT-PF	2005
24	1	13	H	HT-PF	2005
29	3	25	H	HT-PF	2006
36	8	67	H	HT	2005
36	10	32	H	HT	2005
36	14	21	H	HT	2005
37	2	17	H	HT-PF	2005
37	10	11	H	HT-PF	2005
37	13	13	H	HT-PF	2005
37	15	15	H	HT-PF	2005
37	16	23	H	HT-PF	2005
38	1	31	H	HT	2007
38	5	21	H	HT-PF	2007
38	7	46	H	HT-PF	2007
38	11	33	H	HT-PF	2007
39	27	27	H	HT	2007
39	29	17	H	HT	2007
39	31	25	H	HT	2007
39	32	22	H	HT	2007
42	12	16	H	HT	2007
42	22	12	H	HT	2007

Compt.	Stand	Acres	DFC	Year
45	13	41	H	2007
45	17	22	H	2007
47	11	45	H	2007
49	6	28	H	2007
50	6	43	H	2007
50	18	25	H	2007
51	3	14	H	2008
51	8	44	H	2008
51	20	93	H	2008
52	10	28	H	2007
52	13	21	H	2007
52	14	9	H	2007
52	16	91	H	2007
52	17	35	H	2007
52	23	23	H	2007
52	27	24	H	2007
52	36	22	H	2007
52	41	22	H	2007
52	42	18	H	2007
53	11	87	H	2007
53	13	32	H	2007
59	15	31	H	2008
59	18	31	H	2008
67	3	25	H	2007
68	13	42	H	2004
69	15	42	H	2008
69	20	44	H	2008
70	1	51	H	2008
76	31	15	H	2006
76	36	22	H	2006
76	48	9	H	2006
76	49	39	H	2006
78	14	136	H	2006
80	17	30	H	2006
90	1	48	H	2008
90	2	11	H	2008
90	7	46	H	2008
90	10	28	H	2008
90	24	25	H	2008
91	2	67	H	2008
91	4	35	H	2008
91	5	26	H	2008
92	10	67	H	2004
94	1	4	H	2005
94	7	32	H	2005
94	11	84	H	2005
95	2	38	H	2005
95	7	33	H	2005

Compt.	Stand	Acres	DFC	Treatment	Year
42	27	13	H	HT	2007
42	33	16	H	HT	2007
43	4	70	H	HT-PF	2007
43	6	55	H	HT-PF	2007
45	2	61	H	HT	2008
45	4	49	H	HT	2008
46	3	39	H	HT-PF	2006
46	6	14	H	HT-PF	2006
49	20	31	H	HT	2005
51	8	18	H	HT	2005
51	11	23	H	HT	2005
52	13	10	H	HT	2005
52	27	11	H	HT-PF	2005
53	5	56	H	HT	2008
53	11	29	H	HT	2008
53	13	13	H	HT	2008
54	10	32	H	HT	2008
55	6	19	H	HT	2008
55	9	20	H	HT	2008
55	12	19	H	HT	2008
55	14	15	H	HT	2008
55	15	74	H	HT	2008
57	9	29	H	HT	2008
57	11	95	H	HT	2008
57	14	56	H	HT	2008
59	4	69	H	HT	2008
59	13	13	H	HT	2008
59	14	54	H	HT	2008
60	1	37	H	HT	2008
60	6	129	H	HT	2008
65	1	23	H	HT	2008
65	3	13	H	HT	2008
65	4	31	H	HT	2008
65	12	20	H	HT	2008
65	13	41	H	HT	2008
65	16	13	H	HT	2008
65	19	18	H	HT	2008
66	2	10	H	HT-PF	2007
66	3	19	H	HT-PF	2007
66	7	73	H	HT-PF	2007
67	6	16	H	HT	2007
67	11	16	H	HT	2007
67	12	34	H	HT	2007
68	6	70	H	HT	2007
68	8	27	H	HT	2007
68	11	13	H	HT	2007
69	22	105	H	HT	2007
70	10	136	H	HT-PF	2005

Compt.	Stand	Acres	DFC	Year
95	12	18	H	2005
95	14	71	H	2005
95	20	86	H	2005
95	24	29	H	2005
95	35	2	H	2005
101	2	30	H	2008
101	7	164	H	2008
104	7	28	H	2008
116	6	24	H	2005
116	8	80	H	2005
117	6	9	H	2007
117	14	86	H	2007
118	5	59	H	2007
118	6	114	H	2007
119	5	20	H	2008
136	13	42	H	2008
Area 1 Total		**4092**	*Hardwood*	
		Area 2 Thin		
8	7	24	H	2006
8	9	50	H	2006
8	12	44	S	2006
8	14	51	S	2006
8	23	58	S	2006
8	32	90	S	2006
19	3	24	S	2005
19	9	29	H	2005
20	4	19	H	2007
20	5	12	H	2007
20	8	19	H	2007
20	9	32	H	2007
20	11	47	H	2007
20	21	26	H	2007
20	22	32	H	2007
20	27	5	H	2007
21	18	41	S	2008
31	14	84	S	2005
31	19	55	S	2005
32	1	25	S	2004
32	3	18	S	2004
32	8	8	S	2004
32	14	33	S	2004
32	15	31	S	2004
32	18	43	S	2004
33	3	44	S	2005
33	10	27	S	2005
33	19	63	S	2005
33	23	55	S	2005

Compt.	Stand	Acres	DFC	Treatment	Year
70	15	43	H	HT-PF	2005
70	23	41	H	HT-PF	2005
70	28	19	H	HT-PF	2005
76	18	55	H	HT	2006
76	26	30	H	HT	2006
77	3	22	H	HT	2006
77	6	12	H	HT	2006
81	5	76	H	HT	2006
81	6	21	H	HT	2006
90	10	34	H	HT-PF	2006
90	16	24	H	HT	2006
90	19	21	H	HT-PF	2006
90	20	46	H	HT-PF	2006
90	24	18	H	HT-PF	2006
91	4	12	H	HT	2006
91	6	21	H	HT	2006
92	4	12	H	HT	2006
92	13	61	H	HT	2006
92	24	15	H	HT	2006
93	5	14	H	HT	2006
93	11	21	H	HT	2006
94	1	47	H	HT-PF	2007
94	2	19	H	HT-PF	2007
94	7	35	H	HT	2007
94	11	35	H	HT	2007
95	11	32	H	HT-PF	2007
96	11	11	H	HT	2006
104	7	18	H	HT	2006
116	3	20	H	HT-PF	2004
116	6	13	H	HT-PF	2004
117	3	11	H	HT	2006
117	20	102	H	HT	2006
118	6	23	H	HT-PF	2006
118	11	96	H	HT	2006
118	25	45	H	HT-PF	2006
119	11	42	H	HT	2006
119	16	20	H	HT-PF	2006
119	19	11	H	HT-PF	2006
119	21	29	H	HT-PF	2006
134	1	14	H	HT	2005
136	15	58	H	HT	2005
136	19	13	H	HT	2005
137	16	26	H	HT	2005
137	18	43	H	HT	2005
138	1	49	H	HT	2005
138	11	48	H	HT	2005
Area 1 Total		**4354**	*Hardwood*		

Compt.	Stand	Acres	DFC	Year
34	5	29	H	2005
34	14	37	S	2005
34	22	38	S	2005
121	20	13	H	2007
122	2	36	H	2007
122	3	11	H	2007
122	16	25	H	2007
122	24	9	H	2007
124	16	102	S	2004
124	20	78	S	2004
125	23	169	S	2006
125	31	91	S	2006
125	38	124	S	2006
126	5	41	S	2006
126	15	87	S	2006
126	21	23	S	2006
126	23	71	S	2006
126	26	34	H	2006
126	31	35	H	2006
126	40	88	S	2006
126	49	8	S	2006
127	21	66	S	2007
128	3	32	S	2005
128	10	34	S	2005
128	12	57	S	2005
128	19	46	H	2005
129	15	31	S	2007
129	26	53	S	2007
130	1	31	S	2006
130	7	29	S	2006
130	12	57	S	2006
130	14	53	S	2006
130	20	39	S	2006
131	12	27	S	2005
131	16	41	S	2005
132	3	12	H	2005
132	5	29	S	2005
132	10	43	S	2005
132	13	49	S	2005
132	17	15	H	2005
133	17	79	H	2007
139	2	38	H	2008
139	18	20	H	2008
139	21	17	H	2008
140	4	34	H	2008
140	9	31	H	2008
140	12	36	H	2008
141	20	53	H	2007

Compt.	Stand	Acres	DFC	Treatment	Year
Area 2 Restore					
8	5	5	S	DC-PF-PS	2008
8	7	11	H	HT	2005
8	13	1	S	DC-PF-PS	2008
8	14	8	S	DC-PF-PS	2008
8	22	43	H	HT-PF	2005
8	23	137	S	DC-PF-PS	2008
8	32	54	S	DC-PF-PS	2008
20	5	22	H	HT	2005
20	9	13	H	HT	2005
20	27	24	H	HT	2005
21	1	12	S	DC-PF-PS	2004
21	3	96	S	DC-PF-PS	2004
21	4	44	S	DC-PF-PS	2004
21	5	15	H	HT-PF	2005
21	11	41	S	DC-PF-PS	2004
32	1	17	S	DC-PF-PS	2006
32	4	47	S	DC-PF-PS	2006
32	6	19	S	DC-PF-PS	2006
32	8	15	S	DC-PF-PS	2006
33	14	11	H	HT-PF	2005
48	1	21	H	HT	2005
48	3	12	H	HT	2005
121	5	35	H	HT	2007
121	18	14	H	HT	2007
124	2	32	H	HT	2004
124	3	16	H	HT	2004
124	5	35	H	HT	2004
124	8	41	H	HT	2004
124	11	19	H	HT	2004
124	16	188	S	DC-PF-PS	2006
124	20	17	H	HT	2004
124	20	33	S	DC-PF-PS	2006
125	15	29	H	HT-PF	2005
126	1	17	H	HT	2005
126	3	37	H	HT	2005
126	15	11	S	DC-PF-PS	2008
126	17	10	H	HT-PF	2005
126	19	14	S	DC-PF-PS	2008
127	16	18	H	HT	2005
129	5	9	S	DC-PF-PS	2006
129	15	10	S	DC-PF-PS	2006
130	1	31	S	DC-PF-PS	2008
131	12	10	S	DC-PF-PS	2006
132	5	11	S	DC-PF-PS	2004
132	6	37	S	DC-PF-PS	2004
132	7	13	S	DC-PF-PS	2004
132	8	15	S	DC-PF-PS	2004

Compt.	Stand	Acres	DFC	Year
143	8	5	H	2008
143	9	26	H	2008
143	11	51	H	2008
143	21	22	H	2008
Area 2 Total		**3394**		
		2422	*Shortleaf*	
		972	*Hardwood*	
		Area 3 Thin		
148	6(46)	34	H	2004
148	10	69	L	2004
148	15	47	H	2004
149	6	25	L	2006
149	7	44	L	2006
149	17	80	H	2006
149	18	33	L	2006
149	19	82	L	2006
150	2	23	H	2006
150	4	85	L	2006
150	7	3	H	2006
150	10	36	H	2006
151	21	32	H	2006
151	24	7	H	2006
151	29	10	H	2006
152	10	30	H	2008
152	25	43	H	2008
153	15	10	H	2008
154	19	30	H	2008
157	10	32	H	2004
157	19	19	H	2008
157	22	18	H	2008
159	9	22	L	2004
160	10	68	L	2008
160	17	32	L	2008
160	24	54	L	2008
160	26	40	L	2008
160	30	24	L	2008
161	1	8	L	2006
161	2	14	L	2006
161	6	49	L	2006
161	9	100	L	2006
163	20	38	H	2007
163	22	54	H	2007
163	26	32	H	2004
163	30	13	H	2004
163	39	27	H	2004
164	4	45	H	2004
164	20	33	H	2004

Compt.	Stand	Acres	DFC	Treatment	Year
132	15	13	S	DC-PF-PS	2004
132	17	15	H	HT	2005
133	2	86	S	DC-PF-PS	2006
133	9	46	S	DC-PF-PS	2006
133	17	40	H	HT	2004
139	1	15	H	HT	2007
139	5	31	H	HT	2007
139	6	16	H	HT	2007
139	13	43	H	HT	2007
139	17	11	H	HT	2007
139	19	12	H	HT	2007
139	22	64	H	HT	2007
139	26	22	H	HT	2007
143	21	11	H	HT	2007
Area 2 Total		**1795**			
		1023	*Shortleaf*		
		772	*Hardwood*		
		Area 3 Restore			
148	15	11	H	HT	2006
148	20	36	H	HT	2006
148	22	9	H	HT	2006
148	37	14	H	HT	2006
149	4	5	L	DC-PF-PL	2005
149	5	16	L	DC-PF-PL	2005
149	8	10	H	HT-PF	2005
149	19	39	L	DC-PF-PL	2005
150	4	20	L	DC-PF-PL	2005
150	7	60	H	HT	2008
150	8	25	H	HT	2008
150	19	12	H	HT	2008
150	20	21	H	HT	2008
150	23	6	H	HT	2008
150	24	10	H	HT	2008
151	9	16	H	HT	2008
151	10	72	H	HT	2008
151	11	84	H	HT	2008
151	16	19	H	HT	2008
151	22	5	H	HT	2008
151	24	5	H	HT	2008
151	33	15	L	DC-PF-PL	2005
151	39	32	H	HT-PF	2008
151	49	11	L	DC-PF-PL	2005
151	56	1	H	HT	2008
152	11	17	H	HT	2005
159	1	7	H	HT-PF	2004
159	1	23	L	DC-PF-PL	2006
159	9	3	H	HT-PF	2004

Compt.	Stand	Acres	DFC	Year
165	20	24	L	2005
165	24	49	L	2005
165	25	30	L	2005
166	23	37	H	2005
166	30	144	L	2005
166	31	23	L	2005
166	32	6	L	2005
170	29	20	H	2007
170	33	25	H	2007
170	36	23	H	2007
170	49	20	H	2007
171	3	22	H	2007
171	26	59	H	2007
171	34	39	H	2007
Area 3 Total		**1966**		
		1025	*Longleaf*	
		941	*Hardwood*	
Pine DFC	***3447***			
Hardwood DFC	***6005***			
Total Thin	**9452**			

Compt.	Stand	Acres	DFC	Treatment	Year
160	10	15	L	DC-PF-PL	2004
160	25	18	L	DC-PF-PL	2004
160	26	6	L	DC-PF-PL	2004
163	26	14	H	HT	2006
164	15	10	H	HT	2007
166	19	6	H	HT	2004
166	20	37	H	HT	2004
166	21	1	H	HT	2004
Area 3 Total		**711**			
		168	*Longleaf*		
		543	*Hardwood*		
Pine DFC		***1191***			
Hardwood DFC		***5669***			
Total Restore		**6860**			

Treatment Column:
DC = Roller Drum Chop
HT = Handtools
PF = Prescribed Fire
PS = Plant Shortleaf
PL = Plant Longleaf
NT = No Treatment

DFC Column:
H = Hardwood
S = Shortleaf
L = Longleaf

Year Column:
Planned Treatment Year

Alternative 4 Proposed Actions List

Compt.	Stand	Acres	DFC	Year
Area 1 Thin				
9	2	74	H	2008
9	5	13	H	2008
9	7	26	H	2008
10	6	75	H	2008
10	10	38	H	2008
10	11	9	H	2008
15	10	28	H	2004
15	11	45	H	2004
16	1	76	H	2004
16	5	25	H	2004
17	13	41	H	2004
18	4	56	H	2005
18	7	28	H	2005
18	11	33	H	2005
22	9	32	H	2008

Compt.	Stand	Acres	DFC	Treatment	Year
Area 1 Restore					
5	18	16	H	HT-NT	2005
5	30	11	H	HT-NT	2005
6	13	11	H	HT-NT	2005
7	10	55	H	HT-NT	2005
9	5	76	H	HT-PF-NT	2006
10	11	23	H	HT-PF-NT	2006
10	15	32	H	HT-PF-NT	2006
15	13	44	H	HT-PF-NT	2006
15	24	41	H	HT-NT	2006
16	1	31	H	HT-NT	2006
18	4	65	H	HT-PF-NT	2007
18	17	10	H	HT-PF-NT	2007
22	17	17	H	HT-PF-NT	2005
22	26	33	H	HT-PF-NT	2005
23	6	35	H	HT-NT	2005

Compt.	Stand	Acres	DFC	Year
22	19	30	H	2008
22	23	50	H	2008
22	27	40	H	2008
22	29	20	H	2008
23	15	121	H	2008
24	12	33	H	2008
30	2	28	H	2007
30	8	33	H	2007
30	14	36	H	2007
35	23	25	H	2005
36	14	32	H	2007
37	7	30	H	2007
37	10	33	H	2007
37	13	23	H	2007
38	3	34	H	2005
38	7	29	H	2005
38	11	19	H	2005
43	6	91	H	2005
43	20	50	H	2005
44	1	31	H	2007
44	13	15	H	2007
45	13	41	H	2007
45	17	22	H	2007
47	11	45	H	2007
49	6	28	H	2007
50	6	43	H	2007
50	18	25	H	2007
51	3	14	H	2008
51	8	44	H	2008
51	20	93	H	2008
52	10	28	H	2007
52	13	21	H	2007
52	14	9	H	2007
52	16	91	H	2007
52	17	35	H	2007
52	23	23	H	2007
52	27	24	H	2007
52	36	22	H	2007
52	41	22	H	2007
52	42	18	H	2007
53	11	87	H	2007
53	13	32	H	2007
59	15	31	H	2008
59	18	31	H	2008
67	3	25	H	2007
68	13	42	H	2004
69	15	42	H	2008
69	20	44	H	2008

Compt.	Stand	Acres	DFC	Treatment	Year
23	15	42	H	HT-PF-NT	2005
24	1	13	H	HT-PF-NT	2005
29	3	25	H	HT-PF-NT	2008
36	8	67	H	HT-NT	2005
36	10	32	H	HT-NT	2005
36	14	21	H	HT-NT	2005
37	2	17	H	HT-PF-NT	2005
37	10	11	H	HT-PF-NT	2005
37	13	13	H	HT-PF-NT	2005
37	15	15	H	HT-PF-NT	2005
37	16	23	H	HT-PF-NT	2005
38	1	31	H	HT-NT	2007
38	5	21	H	HT-PF-NT	2007
38	7	46	H	HT-PF-NT	2007
38	11	33	H	HT-PF-NT	2007
39	27	27	H	HT-NT	2007
39	29	17	H	HT-NT	2007
39	31	25	H	HT-NT	2007
39	32	22	H	HT-NT	2007
42	12	16	H	HT-NT	2007
42	22	12	H	HT-NT	2007
42	27	13	H	HT-NT	2007
42	33	16	H	HT-NT	2007
43	4	70	H	HT-PF-NT	2007
43	6	55	H	HT-PF-NT	2007
45	2	61	H	HT-NT	2008
45	4	49	H	HT-NT	2008
46	3	39	H	HT-PF-NT	2006
46	6	14	H	HT-PF-NT	2006
49	20	31	H	HT-NT	2005
51	8	18	H	HT-NT	2005
51	11	23	H	HT-NT	2005
52	13	10	H	HT-NT	2005
52	27	11	H	HT-PF-NT	2005
53	5	56	H	HT-NT	2008
53	11	29	H	HT-NT	2008
53	13	13	H	HT-NT	2008
54	10	32	H	HT-NT	2008
55	6	19	H	HT-NT	2008
55	9	20	H	HT-NT	2008
55	12	19	H	HT-NT	2008
55	14	15	H	HT-NT	2008
55	15	74	H	HT-NT	2008
57	9	29	H	HT-NT	2008
57	11	95	H	HT-NT	2008
57	14	56	H	HT-NT	2008
59	4	69	H	HT-NT	2008
59	13	13	H	HT-NT	2008

Compt.	Stand	Acres	DFC	Year
70	1	51	H	2008
76	31	15	H	2006
76	36	22	H	2006
76	48	9	H	2006
76	49	39	H	2006
78	14	136	H	2006
80	17	30	H	2006
90	1	48	H	2008
90	2	11	H	2008
90	7	46	H	2008
90	10	28	H	2008
90	24	25	H	2008
91	2	67	H	2008
91	4	35	H	2008
91	5	26	H	2008
92	10	67	H	2004
94	1	4	H	2005
94	7	32	H	2005
94	11	84	H	2005
95	2	38	H	2005
95	7	33	H	2005
95	12	18	H	2005
95	14	71	H	2005
95	20	86	H	2005
95	24	29	H	2005
95	35	2	H	2005
101	2	30	H	2008
101	7	164	H	2008
104	7	28	H	2008
116	6	24	H	2005
116	8	80	H	2005
117	6	9	H	2007
117	14	86	H	2007
118	5	59	H	2007
119	5	20	H	2008
136	13	42	H	2008
Area 1 Total		**3978**	*Hardwood*	
Area 2 Thin				
8	7	24	H	2006
8	9	50	H	2006
8	12	44	H	2006
8	14	51	H	2006
8	23	58	H	2006
8	32	90	H	2006
19	3	24	H	2005
19	9	29	H	2005
20	4	19	H	2007

Compt.	Stand	Acres	DFC	Treatment	Year
59	14	54	H	HT-NT	2008
60	1	37	H	HT-NT	2008
60	6	129	H	HT-NT	2008
65	1	23	H	HT-NT	2008
65	3	13	H	HT-NT	2008
65	4	31	H	HT-NT	2008
65	12	20	H	HT-NT	2008
65	13	41	H	HT-NT	2008
65	16	13	H	HT-NT	2008
65	19	18	H	HT-NT	2008
66	2	10	H	HT-PF-NT	2007
66	3	19	H	HT-PF-NT	2007
66	7	73	H	HT-PF-NT	2007
67	6	16	H	HT-NT	2007
67	11	16	H	HT-NT	2007
67	12	34	H	HT-NT	2007
68	6	70	H	HT-NT	2007
68	8	27	H	HT-NT	2007
68	11	13	H	HT-NT	2007
69	22	105	H	HT-NT	2007
70	10	136	H	HT-PF-NT	2005
70	15	43	H	HT-PF-NT	2005
70	23	41	H	HT-PF-NT	2005
70	28	19	H	HT-PF-NT	2005
76	18	55	H	HT-NT	2005
76	26	30	H	HT-NT	2005
77	3	22	H	HT-NT	2005
77	6	12	H	HT-NT	2005
81	5	76	H	HT-NT	2005
81	6	21	H	HT-NT	2005
90	10	34	H	HT-PF-NT	2006
90	16	24	H	HT-NT	2006
90	19	21	H	HT-PF-NT	2006
90	20	46	H	HT-PF-NT	2006
90	24	18	H	HT-NT	2006
91	4	12	H	HT-NT	2006
91	6	21	H	HT-NT	2006
92	4	12	H	HT-NT	2006
92	13	61	H	HT-NT	2006
92	24	15	H	HT-NT	2006
93	5	14	H	HT-NT	2006
93	11	21	H	HT-NT	2006
94	1	47	H	HT-PF-NT	2007
94	2	19	H	HT-PF-NT	2007
94	7	35	H	HT-NT	2007
94	11	35	H	HT-NT	2007
95	11	32	H	HT-PF-NT	2007
96	11	11	H	HT-NT	2006

Compt.	Stand	Acres	DFC	Year
20	5	12	H	2007
20	8	19	H	2007
20	9	32	H	2007
20	11	47	H	2007
20	21	26	H	2007
20	22	32	H	2007
20	27	5	H	2007
31	14	84	H	2005
31	19	55	H	2005
32	1	25	H	2004
32	3	18	H	2004
32	8	8	H	2004
32	14	33	H	2004
32	15	31	H	2004
32	18	43	H	2004
33	3	44	H	2005
33	10	27	H	2005
34	5	29	H	2005
34	14	37	H	2005
34	22	38	H	2005
121	20	13	H	2007
122	2	36	H	2007
122	3	11	H	2007
122	16	25	H	2007
122	24	9	H	2007
124	20	78	H	2004
125	38	124	H	2006
126	5	41	H	2006
126	15	87	H	2006
126	21	23	H	2006
126	23	71	H	2006
126	26	34	H	2006
126	31	35	H	2006
126	49	8	H	2006
127	21	66	H	2007
128	3	32	H	2005
128	10	34	H	2005
128	12	57	H	2005
128	19	46	H	2005
129	15	31	H	2007
129	26	53	H	2007
130	1	31	H	2006
130	7	29	H	2006
130	12	57	H	2006
130	20	39	H	2006
131	12	27	H	2005
131	16	41	H	2005
132	3	12	H	2005

Compt.	Stand	Acres	DFC	Treatment	Year
104	7	18	H	HT-NT	2006
116	3	20	H	HT-PF-NT	2006
116	6	13	H	HT-PF-NT	2006
117	3	11	H	HT-NT	2006
117	20	102	H	HT-NT	2006
118	6	23	H	HT-PF-NT	2006
118	11	96	H	HT-NT	2006
118	25	45	H	HT-PF-NT	2006
119	11	42	H	HT-NT	2006
119	16	20	H	HT-PF-NT	2006
119	19	11	H	HT-PF-NT	2006
119	21	29	H	HT-PF-NT	2006
134	1	14	H	HT-NT	2005
136	15	58	H	HT-NT	2005
136	19	13	H	HT-NT	2005
137	16	26	H	HT-NT	2005
137	18	43	H	HT-NT	2005
138	1	49	H	HT-NT	2005
138	11	48	H	HT-NT	2005
Area 1 Total		**4354**	*Hardwood*		
		Area 2 Restore			
8	5	5	H	HT-NT	2008
8	7	11	H	HT-NT	2008
8	13	1	H	HT-NT	2008
8	14	8	H	HT-NT	2008
8	22	43	H	HT-PF-NT	2008
8	23	137	H	HT-NT	2008
8	32	54	H	HT-NT	2008
20	5	22	H	HT-NT	2005
20	9	13	H	HT-NT	2005
20	27	24	H	HT-NT	2005
21	1	12	H	HT-NT	2004
21	3	96	H	HT-NT	2004
21	4	44	H	HT-NT	2004
21	5	15	H	HT-PF-NT	2004
21	11	41	H	HT-NT	2004
32	1	17	H	HT-NT	2006
32	4	47	H	HT-NT	2006
32	6	19	H	HT-NT	2006
32	8	15	H	HT-NT	2006
33	14	11	H	HT-PF-NT	2005
48	1	21	H	HT-NT	2005
48	3	12	H	HT-NT	2005
121	5	35	H	HT-NT	2007
121	18	14	H	HT-NT	2007
124	2	32	H	HT-NT	2004
124	3	16	H	HT-NT	2004

Compt.	Stand	Acres	DFC	Year
132	5	29	H	2005
132	10	43	H	2005
132	17	15	H	2005
133	17	79	H	2007
139	2	38	H	2008
139	18	20	H	2008
139	21	17	H	2008
140	4	34	H	2008
140	9	31	H	2008
140	12	36	H	2008
141	20	53	H	2007
143	8	5	H	2008
143	9	26	H	2008
143	11	51	H	2008
143	21	22	H	2008
Area 2 Total		**2683**	*Hardwood*	
		Area 3 Thin		
148	6(46)	34	H	2004
148	10	69	L	2004
148	15	47	H	2004
149	6	25	L	2006
149	7	44	L	2006
149	17	80	H	2006
149	18	33	L	2006
149	19	82	L	2006
150	2	23	H	2006
150	4	85	L	2006
150	7	3	H	2006
150	10	36	H	2006
151	21	32	H	2006
151	24	7	H	2006
151	29	10	H	2006
152	10	30	H	2008
152	25	43	H	2008
153	15	10	H	2008
154	19	30	H	2008
157	10	32	H	2004
157	19	19	H	2008
157	22	18	H	2008
159	9	22	L	2004
160	10	68	L	2008
160	17	32	L	2008
160	24	54	L	2008
160	26	40	L	2008
160	30	24	L	2008
161	1	8	L	2006
161	2	14	L	2006

Compt.	Stand	Acres	DFC	Treatment	Year
124	5	35	H	HT-NT	2004
124	8	41	H	HT-NT	2004
124	11	19	H	HT-NT	2004
124	16	188	H	HT-NT	2004
124	20	17	H	HT-NT	2004
124	20	18	H	HT-NT	2004
124	20	15	H	HT-NT	2004
125	15	29	H	HT-PF-NT	2005
126	1	17	H	HT-NT	2005
126	3	37	H	HT-NT	2005
126	15	11	H	HT-NT	2005
126	17	10	H	HT-PF-NT	2005
126	19	14	H	HT-NT	2005
127	16	18	H	HT-NT	2005
129	5	9	H	HT-NT	2006
129	15	10	H	HT-NT	2006
130	1	31	H	HT-NT	2006
131	12	10	H	HT-NT	2006
132	5	11	H	HT-NT	2004
132	6	37	H	HT-NT	2004
132	7	13	H	HT-NT	2004
132	8	15	H	HT-NT	2004
132	15	13	H	HT-NT	2004
132	17	15	H	HT-NT	2004
133	2	86	H	HT-NT	2006
133	9	46	H	HT-NT	2006
133	17	40	H	HT-NT	2006
139	1	15	H	HT-NT	2007
139	5	31	H	HT-NT	2007
139	6	16	H	HT-NT	2007
139	13	43	H	HT-NT	2007
139	17	11	H	HT-NT	2007
139	19	12	H	HT-NT	2007
139	22	64	H	HT-NT	2007
139	26	22	H	HT-NT	2007
143	21	11	H	HT-NT	2007
Area 2 Total		**1795**	*Hardwood*		
		Area 3 Restore			
148	15	11	H	HT-NT	2006
148	20	36	H	HT-NT	2006
148	22	9	H	HT-NT	2006
148	37	14	H	HT-NT	2006
149	4	5	L	DC-PF-PL	2008
149	5	16	L	DC-PF-PL	2008
149	8	10	H	HT-NT	2005
149	19	39	L	DC-PF-PL	2008
150	4	20	L	DC-PF-PL	2008

Compt.	Stand	Acres	DFC	Year
161	6	49	L	2006
161	9	100	L	2006
163	20	38	H	2007
163	22	54	H	2007
163	26	32	H	2004
163	30	13	H	2004
163	39	27	H	2004
164	4	45	H	2004
164	20	33	H	2004
165	20	24	L	2005
165	24	49	L	2005
165	25	30	L	2005
166	23	37	H	2005
166	30	144	L	2005
166	31	23	L	2005
166	32	6	L	2005
170	29	20	H	2007
170	33	25	H	2007
170	36	23	H	2007
170	49	20	H	2007
171	3	22	H	2007
171	26	59	H	2007
171	34	39	H	2007
Area 3 Total		**1966**		

Longleaf DFC	*1025*
Hdwd DFC	*941*
Pine DFC	***1025***
Hdwd DFC	***7602***
Total Thin	**8627**

Compt.	Stand	Acres	DFC	Treatment	Year
150	7	60	H	HT-NT	2007
150	8	25	H	HT-NT	2007
150	19	12	H	HT-NT	2007
150	20	21	H	HT-NT	2007
150	23	6	H	HT-NT	2007
150	24	10	H	HT-NT	2007
151	9	16	H	HT-NT	2008
151	10	72	H	HT-NT	2008
151	11	84	H	HT-NT	2008
151	16	19	H	HT-NT	2008
151	22	5	H	HT-NT	2008
151	24	5	H	HT-NT	2008
151	33	15	L	DC-PF-PL	2008
151	39	32	H	HT-NT	2008
151	49	11	L	DC-PF-PL	2008
151	56	1	H	HT-NT	2008
152	11	17	H	HT-NT	2005
159	1	7	H	HT-PF-NT	2004
159	1	23	L	DC-PF-PL	2006
159	9	3	H	HT-PF-NT	2004
160	10	15	L	DC-PF-PL	2004
160	25	18	L	DC-PF-PL	2004
160	26	6	L	DC-PF-PL	2004
163	26	14	H	HT-NT	2008
Compt.	**Stand**	**Acres**	**DFC**	**Treatment**	**Year**
164	15	10	H	HT-NT	2004
166	19	6	H	HT-NT	2004
166	20	37	H	HT-NT	2004
166	21	1	H	HT-NT	2004
Area 3 Total		**711**			
		168	*Longleaf DFC*		
		543	*Hardwood DFC*		
Pine DFC		***168***			
Hdwd DFC		***6692***			
Total Restore		**6860**			

Treatment Column:
DC = Roller Drum Chop
HT = Handtools
PF = Prescribed Fire
PS = Plant Shortleaf
PL = Plant Longleaf
NT = No Treatment

DFC Column:
H = Hardwood
S = Shortleaf
L = Longleaf

Year Column:
Planned Treatment Year

Tentative/Planned Schedule of Treatments for Alternative 2

ENTRY YEAR 2004

Site Preparation for Hardwood

Compt.	Stand	Acres
65	1	23
65	3	13
65	4	31
65	12	20
65	13	41
65	16	13
65	19	18
66	2	10
66	3	19
66	7	63
66	7	10
67	6	16
67	11	16
67	11	45
67	12	34
68	6	70
68	8	27
68	9	55
68	9	25
68	11	13
69	22	105
116	3	20
116	6	13
116	7	15
Total Acres		**715**

Site Preparation for Pine

Compt.	Stand	Acres
21	1	12
21	3	96
21	4	24
21	4	20
21	5	15
21	11	41
132	3	4
132	5	11
132	6	37
132	7	13
132	8	15
132	15	13
132	17	15
160	10	15
160	25	18
160	26	6
Total Acres		**355**

Plant Pine

Compt.	Stand	Acres

Thin

Compt.	Stand	Acres
1	19	19
6	4	35
15	3	39
15	5	37
15	6	18
15	8	25
15	10	28
15	11	45
16	1	76
16	5	25
17	6	54
17	13	41
32	1	25
32	3	19
32	14	33
32	15	31
32	18	43
64	7	285
64	12	46
65	7	23
65	11	32
65	13	70
68	1	39
68	13	42
77	6	41
92	4	45
92	9	28
92	10	67
92	28	76
124	16	158
124	20	78
124	21	16
148	6	20
148	10	69
148	11	20
148	12	19
148	15	47
148	17	70
148	23	23
148	25	12

ENTRY YEAR 2004 (continued)

Site Preparation for Hardwood			Site Preparation for Pine			Plant Pine			Thin		
Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres
									148	27	52
									148	28	37
									148	31	27
									157	10	32
									159	9	22
									163	26	32
									163	30	13
									163	39	27
									164	4	46
									164	15	40
									164	17	83
									164	20	33
									164	28	12
									164	30	14
									Total Acres		**2389**

ENTRY YEAR 2005

Site Preparation for Hardwood			Site Preparation for Pine			Plant Pine			Thin		
Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres
5	18	16	20	5	22	21	1	12	3	11	8
5	30	11	20	9	13	21	3	96	3	17	32
7	10	38	20	11	3	21	4	24	3	24	23
7	10	17	20	27	11	21	4	20	13	18	12
22	17	17	20	27	13	21	5	15	13	25	28
22	26	33	33	14	11	21	11	41	13	27	33
23	6	35	127	16	18	132	3	4	14	12	56
23	15	28	148	15	11	132	5	11	14	14	49
23	15	14	148	20	36	132	6	37	14	16	41
36	8	67	148	22	9	132	7	13	18	4	56
36	10	32	148	37	14	132	8	15	18	7	28
36	14	21	151	9	16	132	15	13	18	11	33
37	2	17	151	10	72	132	17	15	18	16	29
37	10	11	151	11	84	160	10	15	18	30	2
37	13	13	151	14	8	160	25	18	19	3	24
37	15	15	151	16	19	160	26	6	19	9	29
37	16	23	151	22	5	**Total Acres**		**355**	29	3	53
51	8	18	151	24	5				29	6	37
51	11	23	151	33	15				29	7	8
52	13	10	151	34	6				29	8	42

ENTRY YEAR 2005 (continued)											
Site Preparation for Hardwood			Site Preparation for Pine			Plant Pine			Thin		
Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres
52	27	11	151	39	32				29	11	76
60	1	37	151	49	11				31	3	102
60	6	129	151	49	5				31	4	33
70	10	136	151	56	1				31	14	84
70	15	43	152	11	17				31	19	55
70	23	41	163	26	14				33	3	44
70	28	19	166	9	3				33	10	27
76	18	55	166	18	6				33	19	63
76	25	11	166	19	6				33	23	55
76	26	30	166	20	7				34	3	33
Total Acres		**971**	166	20	24				34	5	29
			166	20	6				34	14	37
			166	21	1				34	22	38
			Total Acres		**524**				35	23	25
									38	3	34
									38	7	29
									38	11	19
									42	3	13
									42	9	5
									42	12	34
									42	15	2
									42	21	114
									42	22	51
									42	23	9
									42	25	26
									42	26	35
									42	27	1
									42	29	63
									43	6	91
									43	20	50
									43	24	40
									79	5	10
									79	15	20
									79	18	11
									81	17	22
									94	1	4
									94	7	32
									94	11	84
									95	2	38
									95	7	33
									95	12	18
									95	14	71
									95	16	101
									95	20	86

ENTRY YEAR 2005 (continued)											
Site Preparation for Hardwood			Site Preparation for Pine			Plant Pine			Thin		
Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres
									95	24	29
									95	35	2
									116	6	24
									116	8	80
									116	9	147
									116	10	54
									128	3	32
									128	10	34
									128	12	57
									128	19	46
									128	33	110
									131	12	27
									131	16	41
									132	3	12
									132	5	29
									132	10	43
									132	13	49
									132	17	15
									165	20	24
									165	21	20
									165	24	49
									165	25	30
									166	4	12
									166	11	12
									166	23	37
									166	26	26
									166	30	144
									166	31	23
									166	32	6
									166	35	13
									Total Acres		3697

ENTRY YEAR 2006

Site Preparation for Hardwood			Site Preparation for Pine			Plant Pine			Thin		
Compt.	Stand	Acres	Compt	Stand	Acres	Compt	Stand	Acres	Compt	Stand	Acres
6	13	11	32	1	17	20	5	22	4	1	41
9	5	76	32	4	47	20	9	13	4	8	34
9	11	18	32	6	19	20	11	3	4	12	40
10	11	23	32	8	23	20	27	11	4	14	148
10	15	32	124	2	32	20	27	13	4	20	167
15	13	44	124	3	16	33	14	11	4	32	37
15	24	41	124	4	15	127	16	18	8	4	30
16	1	13	124	5	35	148	15	11	8	5	124
16	1	21	124	8	41	148	20	36	8	7	24
16	10	9	124	11	19	148	22	9	8	9	50
24	1	13	124	16	99	148	37	14	8	12	44
29	3	25	124	16	89	151	9	16	8	14	51
46	3	39	124	20	35	151	10	72	8	23	59
46	6	14	124	20	14	151	11	84	8	32	90
59	4	69	133	2	86	151	14	8	39	17	13
59	13	13	133	9	46	151	16	19	39	19	8
59	14	54	133	17	40	151	22	5	40	2	18
77	3	22	**Total Acres**		**673**	151	24	5	40	3	74
77	6	12				151	33	15	40	8	39
77	12	12				151	34	6	40	10	53
81	5	53				151	39	32	40	13	86
81	5	23				151	49	11	40	14	76
81	6	21				151	49	5	58	3	28
90	10	12				151	56	1	58	5	12
90	10	22				152	11	17	58	8	5
90	16	12				163	26	14	58	17	11
90	16	12				166	9	3	58	21	4
90	19	21				166	18	6	58	23	10
90	20	46				166	19	6	58	26	81
90	24	18				166	20	7	58	31	26
91	4	12				166	20	24	76	27	4
91	6	21				166	20	6	76	31	15
92	4	12				166	21	1	76	36	22
92	13	34				**Total Acres**		**524**	76	48	9
92	13	27							76	49	39
92	24	15							78	2	8
93	5	14							78	10	18
93	11	11							78	14	136
93	11	10							80	2	45
96	11	11							80	3	11
Total Acres		**968**							80	12	37
									80	13	63
									80	16	37

ENTRY YEAR 2006 (continued)											
Site Preparation for Hardwood			Site Preparation for Pine			Plant Pine			Thin		
Compt.	Stand	Acres	Compt	Stand	Acres	Compt	Stand	Acres	Compt	Stand	Acres
									80	17	30
									93	4	18
									93	9	25
									93	11	24
									93	21	38
									125	23	168
									125	31	91
									125	38	124
									125	59	12
									125	66	38
									126	5	41
									126	12	46
									126	15	88
									126	21	23
									126	23	71
									126	26	34
									126	30	19
									126	31	35
									126	40	88
									126	49	8
									130	1	31
									130	7	29
									130	12	57
									130	14	53
									130	20	39
									149	6	26
									149	7	44
									150	2	23
									150	4	85
									150	7	3
									150	10	36
									151	21	32
									151	24	7
									151	29	10
									161	1	8
									161	2	14
									161	6	49
									161	9	101
									161	15	27
									161	16	29
									161	27	42
									Total Acres		**3693**

ENTRY YEAR 2007

Site Preparation for Hardwood

Compt.	Stand	Acres
18	4	65
18	17	10
18	19	1
38	1	31
38	5	21
38	7	46
38	11	33
39	23	10
39	27	27
39	29	17
39	31	25
39	32	22
42	12	16
42	22	12
42	27	13
42	33	16
43	4	70
43	6	14
43	6	41
45	2	61
45	4	11
45	4	28
45	4	10
49	20	31
55	6	19
55	9	20
55	9	29
55	12	19
55	14	15
55	15	74
55	24	12
57	9	29
57	11	95
57	14	11
57	14	45
Total Acres		**999**

Site Preparation for Pine

Compt.	Stand	Acres
31	14	72
48	1	21
48	3	12
121	5	35
121	18	14
139	1	15
139	5	31
139	6	16
139	13	26
139	13	17
139	17	11
139	19	12
139	22	52
139	22	12
139	26	22
143	21	11
150	2	5
150	4	8
150	4	12
150	4	2
150	4	4
150	7	60
150	8	3
150	16	3
150	17	4
150	17	1
150	19	12
150	20	21
150	23	6
150	24	10
150	27	7
159	1	7
159	1	23
159	9	3
164	7	3
164	7	6
164	15	10
165	24	11
Total Acres		**600**

Plant Pine

Compt.	Stand	Acres
32	1	17
32	4	47
32	6	19
32	8	23
124	2	32
124	3	16
124	4	15
124	5	35
124	8	41
124	11	19
124	16	99
124	16	89
124	20	35
124	20	14
133	2	86
133	9	46
133	17	40
Total Acres		**673**

Thin

Compt.	Stand	Acres
20	4	19
20	5	12
20	8	19
20	9	32
20	11	47
20	16	27
20	18	7
20	21	26
20	22	32
20	27	5
30	2	28
30	5	30
30	8	33
30	14	36
30	15	27
30	18	35
36	10	14
36	11	13
36	14	32
37	2	40
37	7	30
37	9	34
37	10	33
37	13	23
41	8	82
41	11	22
41	13	42
41	15	20
41	16	63
44	1	31
44	11	30
44	12	31
44	13	15
45	13	41
45	17	22
46	4	16
46	7	83
46	14	156
47	11	45
49	6	28
50	2	24
50	6	43

ENTRY YEAR 2007 (continued)											
Site Preparation for Hardwood			Site Preparation for Pine			Plant Pine			Thin		
Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres
									50	18	25
									50	26	22
									51	3	14
									51	8	44
									51	11	36
									51	20	93
									52	10	28
									52	13	21
									52	14	9
									52	16	91
									52	17	35
									52	23	23
									52	27	23
									52	36	22
									52	41	22
									52	42	18
									53	2	20
									53	11	87
									53	13	32
									66	1	30
									66	7	110
									67	3	25
									67	18	15
									67	24	44
									102	8	77
									102	10	62
									102	14	149
									102	18	14
									103	2	16
									103	17	12
									105	1	25
									105	4	118
									117	6	9
									117	7	20
									117	14	86
									118	2	23
									118	5	59
									118	6	104
									118	17	65
									118	19	27
									118	25	26
									121	6	14
									121	20	13
									122	2	36
									122	3	11

ENTRY YEAR 2007 (continued)											
Site Preparation for Hardwood			Site Preparation for Pine			Plant Pine			Thin		
Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres
									122	16	25
									122	24	9
									122	27	20
									127	13	35
									127	20	30
									127	21	66
									127	29	46
									129	15	31
									129	26	53
									133	17	79
									141	20	53
									163	20	38
									163	22	54
									163	31	78
									170	29	20
									170	33	25
									170	36	23
									170	49	20
									171	3	22
									171	22	47
									171	25	4
									171	26	59
									171	32	18
									171	34	39
									Total Acres		**4177**

ENTRY YEAR 2008

Site Preparation for Hardwood

Compt.	Stand	Acres
53	5	56
53	11	29
53	13	13
54	1	9
54	10	32
94	1	47
94	2	19
94	7	35
94	11	23
94	11	12
95	11	32
95	11	19
104	7	18
117	3	11
117	20	15
117	20	87
117	25	14
117	27	28
118	6	23
118	11	96
118	25	45
119	11	42
119	16	20
119	19	11
119	21	29
134	1	14
136	15	58
136	19	13
137	16	26
137	18	43
138	1	49
138	11	48
Total Acres		**1016**

Site Preparation for Pine

Compt.	Stand	Acres
8	5	5
8	7	11
8	13	1
8	14	2
8	14	6
8	22	43
8	23	2
8	23	2
8	23	137
8	32	54
125	15	29
126	1	17
126	3	37
126	15	11
126	17	10
126	19	28
126	19	14
129	5	2
129	5	7
129	15	10
130	1	31
131	12	10
149	4	5
149	5	16
149	6	9
149	8	10
149	10	13
149	19	39
Total Acres		**561**

Plant Pine

Compt.	Stand	Acres
31	14	72
48	1	21
48	3	12
121	5	35
121	18	14
139	1	15
139	5	31
139	6	16
139	13	26
139	13	17
139	17	11
139	19	12
139	22	52
139	22	12
139	26	22
143	21	11
150	2	5
150	4	8
150	4	12
150	4	2
150	4	4
150	7	60
150	8	3
150	16	3
150	17	4
150	17	1
150	19	12
150	20	21
150	23	6
150	24	10
150	27	7
159	1	7
159	1	23
159	9	3
164	7	3
164	7	6
164	15	10
165	24	11
Total Acres		**600**

Thin

Compt.	Stand	Acres
5	1	89
5	5	23
5	9	56
5	16	52
5	23	44
5	29	19
5	30	4
5	32	15
7	2	30
7	10	93
7	11	33
9	2	74
9	5	13
9	7	26
9	11	37
9	14	23
9	16	58
10	2	54
10	6	75
10	10	38
10	11	9
10	14	47
10	18	75
21	18	41
22	9	32
22	19	30
22	23	50
22	27	40
22	29	20
23	1	25
23	2	8
23	5	25
23	7	21
23	15	121
24	12	33
24	20	8
24	21	24
54	12	25
54	18	20
54	20	21
54	32	10
55	1	14
55	6	22

ENTRY YEAR 2008 (continued)											
Site Preparation for Hardwood			Site Preparation for Pine			Plant Pine			Thin		
Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres
									55	15	33
									56	1	170
									56	5	19
									56	7	33
									56	23	152
									57	10	4
									59	15	31
									59	18	31
									69	4	49
									69	15	42
									69	20	44
									70	1	51
									70	18	44
									70	27	43
									90	1	48
									90	2	11
									90	7	46
									90	10	28
									90	24	25
									90	34	11
									90	38	26
									91	2	67
									91	4	35
									91	5	26
									101	1	5
									101	2	30
									101	7	164
									104	7	40
									104	9	46
									104	11	18
									107	2	49
									119	5	20
									119	16	88
									123	6	52
									136	7	9
									136	9	5
									136	13	42
									136	20	19
									139	2	38
									139	18	20
									139	21	17
									140	4	34
									140	9	31
									140	12	36
									143	9	26

ENTRY YEAR 2008 (continued)											
Site Preparation for Hardwood			Site Preparation for Pine			Plant Pine			Thin		
Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres
									143	11	51
									143	21	22
									152	10	30
									152	25	43
									152	28	14
									153	15	10
									154	3	54
									154	7	55
									154	10	68
									154	11	39
									154	15	44
									154	19	30
									154	23	37
									157	19	19
									157	22	18
									160	10	68
									160	17	32
									160	24	54
									160	26	40
									160	30	24
									Total Acres		**4187**

ENTRY YEAR 2009								
Site Preparation for Hardwood			Site Preparation for Pine			Plant Pine		
Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres
						8	5	5
						8	7	11
						8	13	1
						8	14	2
						8	14	6
						8	22	43
						8	23	2
						8	23	2
						8	23	137
						8	32	54
						125	15	29
						126	1	17
						126	3	37
						126	15	11
						126	17	10
						126	19	28
						126	19	14
						129	5	2
						129	5	7
						129	15	10
						130	1	31
						131	12	10
						149	4	5
						149	5	16
						149	6	9
						149	8	10
						149	10	13
						149	19	39
						Total Acres		**561**

Tentative/Planned Schedule of Treatments for Alternative 3, 5, and 6

ENTRY YEAR 2004 - Alternatives 3, 5, 6											
Site Preparation for Hardwood			Site Preparation for Pine			Plant Pine			Thin		
Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres
116	3	20	21	1	12				15	10	28
116	6	13	21	3	96				15	11	45
124	2	32	21	4	24				16	1	10
124	3	16	21	4	20				16	1	66
124	5	35	21	11	41				16	5	25
124	8	41	132	5	11				17	13	41
124	11	19	132	6	37				32	1	25
124	20	17	132	7	13				32	3	18
133	17	40	132	8	15				32	8	8
159	1	7	132	15	13				32	14	33
159	9	3	160	10	15				32	15	31
166	19	6	160	25	18				32	18	43
166	20	37	160	26	6				68	13	42
166	21	1	Total Acres		321				92	10	67
Total Acres		287							124	16	102
									124	20	78
									148	10	69
									148	15	36
									148	15	11
									148	6(46)	34
									157	10	32
									159	9	22
									163	26	32
									163	30	13
									163	39	27
									164	4	45
									164	20	33
									Total Acres		1016

ENTRY YEAR 2005 - Alternatives 3, 5, 6											
Site Preparation for Hardwood			Site Preparation for Pine			Plant Pine			Thin		
Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres
5	18	16	149	4	5	21	1	12	18	4	45
5	30	11	149	5	16	21	3	96	18	4	11
6	13	11	149	19	39	21	4	24	18	7	28
7	10	55	150	4	8	21	4	20	18	11	33
8	7	11	150	4	12	21	11	41	19	3	24
8	22	43	151	33	15	132	5	11	19	9	29
20	5	22	151	49	11	132	6	37	31	14	78
20	9	13	**Total Acres**		**106**	132	7	13	31	14	6
20	27	24				132	8	15	31	19	55
21	5	15				132	15	13	33	3	44
22	17	17				160	10	15	33	10	27
22	26	33				160	25	18	33	19	63
23	6	35				160	26	6	33	23	55
23	15	42				**Total Acres**		**321**	34	5	29
24	1	13							34	14	37
33	14	11							34	22	38
36	8	67							35	23	25
36	10	32							38	3	34
36	14	21							38	7	29
37	2	17							38	11	19
37	10	11							43	6	91
37	13	13							43	20	50
37	15	15							94	1	4
37	16	23							94	7	32
48	1	21							94	11	84
48	3	12							95	2	38
49	20	31							95	7	33
51	8	18							95	12	18
51	11	23							95	14	71
52	13	10							95	20	86
52	27	11							95	24	29
70	10	136							95	35	2
70	15	43							116	6	24
70	23	41							116	8	79
70	28	19							116	8	1
125	15	29							128	3	32
126	1	17							128	10	34
126	3	37							128	12	57
126	17	10							128	19	46
127	16	18							131	12	27
132	17	15							131	16	41
134	1	14							132	3	12
136	15	58							132	5	29

ENTRY YEAR 2005 - Alternatives 3, 5, 6 (continued)

Site Preparation for Hardwood

Compt.	Stand	Acres
136	19	13
137	16	26
137	18	43
138	1	49
138	11	48
149	8	10
152	11	17
Total Acres		**1340**

Site Preparation for Pine

Compt.	Stand	Acres

Plant Pine

Compt.	Stand	Acres

Thin

Compt.	Stand	Acres
132	10	43
132	13	49
132	17	15
165	20	24
165	24	49
165	25	30
166	23	37
166	30	144
166	31	23
166	32	6
Total Acres		**2049**

ENTRY YEAR 2006 - Alternatives 3, 5, 6

Site Preparation for Hardwood

Compt.	Stand	Acres
9	5	76
10	11	23
10	15	32
15	13	44
15	24	41
16	1	31
29	3	25
46	3	39
46	6	14
76	18	55
76	26	30
77	3	22
77	6	12
81	5	76
81	6	21
90	10	34
90	16	24
90	19	21
90	20	46
90	24	18
91	4	12
91	6	21
92	4	12
92	13	61
92	24	15
93	5	14
93	11	21

Site Preparation for Pine

Compt.	Stand	Acres
32	1	17
32	4	47
32	6	19
32	8	15
124	16	99
124	16	89
124	20	18
124	20	15
129	5	2
129	5	7
129	15	10
131	12	10
133	2	86
133	9	46
159	1	23
Total Acres		**503**

Plant Pine

Compt.	Stand	Acres
149	4	5
149	5	16
149	19	39
150	4	8
150	4	12
151	33	15
151	49	11
Total Acres		**106**

Thin

Compt.	Stand	Acres
8	7	24
8	9	50
8	12	44
8	14	51
8	23	17
8	23	29
8	23	12
8	32	55
8	32	35
76	31	15
76	36	22
76	48	9
76	49	39
78	14	136
80	17	30
125	23	168
125	23	1
125	31	91
125	38	124
126	5	41
126	15	15
126	15	72
126	21	23
126	23	71
126	26	34
126	31	35
126	40	88

ENTRY YEAR 2006 - Alternatives 3, 5, 6 (continued)											
Site Preparation for Hardwood			Site Preparation for Pine			Plant Pine			Thin		
Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres
96	11	11							126	49	8
104	7	18							130	1	31
117	3	11							130	7	29
117	20	102							130	12	57
118	6	23							130	14	53
118	11	96							130	20	39
118	25	45							149	6	4
119	11	42							149	6	21
119	16	20							149	7	44
119	19	11							149	17	80
119	21	29							149	18	33
148	15	11							149	19	82
148	20	36							150	2	23
148	22	9							150	4	44
148	37	14							150	4	41
163	26	14							150	7	3
Total Acres		**1332**							150	10	36
									151	21	32
									151	24	7
									151	29	10
									161	1	8
									161	2	14
									161	6	49
									161	9	100
									Total Acres		**2179**

ENTRY YEAR 2007 - Alternatives 3, 5, 6											
Site Preparation for Hardwood			Site Preparation for Pine			Plant Pine			Thin		
Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres
18	4	65				32	1	17	20	4	19
18	17	10				32	4	47	20	5	4
38	1	31				32	6	19	20	5	8
38	5	21				32	8	15	20	8	19
38	7	46				124	16	99	20	9	32
38	11	33				124	16	89	20	11	47
39	27	27				124	20	18	20	21	26
39	29	17				124	20	15	20	22	32
39	31	25				129	5	2	20	27	5
39	32	22				129	5	7	30	2	28
42	12	16				129	15	10	30	8	33
42	22	12				131	12	10	30	14	36

ENTRY YEAR 2007 - Alternatives 3, 5, 6											
Site Preparation for Hardwood			Site Preparation for Pine			Plant Pine			Thin		
Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres
42	27	13				133	2	86	36	14	32
42	33	16				133	9	46	37	7	30
43	4	70				159	1	23	37	10	33
43	6	55				Total Acres		503	37	13	19
66	2	10							37	13	4
66	3	19							44	1	31
66	7	73							44	13	15
67	6	16							45	13	41
67	11	16							45	17	22
67	12	34							47	11	45
68	6	70							49	6	28
68	8	27							50	6	43
68	11	13							50	18	25
69	22	105							52	10	28
94	1	47							52	13	21
94	2	19							52	14	9
94	7	35							52	16	91
94	11	35							52	17	35
95	11	32							52	23	23
121	5	35							52	27	7
121	18	14							52	27	17
139	1	15							52	36	22
139	5	31							52	41	22
139	6	16							52	42	18
139	13	43							53	11	87
139	17	11							53	13	32
139	19	12							67	3	25
139	22	64							117	6	9
139	26	22							117	14	86
143	21	11							118	5	57
164	15	10							118	5	2
Total Acres		1314							118	6	114
									121	20	13
									122	2	36
									122	3	11
									122	16	25
									122	24	9
									127	21	66
									129	15	31
									129	26	53
									133	17	79
									141	20	53
									163	20	38
									163	22	54

ENTRY YEAR 2007 - Alternatives 3, 5, 6 (continued)											
Site Preparation for Hardwood			Site Preparation for Pine			Plant Pine			Thin		
Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres
									170	29	20
									170	33	25
									170	36	23
									170	49	20
									171	3	22
									171	26	59
									171	34	39
									Total Acres		2038

ENTRY YEAR 2008 - Alternatives 3, 5, 6											
Site Preparation for Hardwood			Site Preparation for Pine			Plant Pine			Thin		
Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres
45	2	61	8	5	5				9	2	74
45	4	49	8	13	1				9	5	13
53	5	56	8	14	2				9	7	26
53	11	29	8	14	6				10	6	75
53	13	13	8	23	137				10	10	38
54	10	32	8	32	54				10	11	9
55	6	19	126	15	11				21	18	41
55	9	20	126	19	14				22	9	32
55	12	19	130	1	31				22	19	30
55	14	15	Total Acres		261				22	23	50
55	15	74							22	27	40
57	9	29							22	29	20
57	11	95							23	15	4
57	14	56							23	15	117
59	4	69							24	12	33
59	13	13							51	3	14
59	14	54							51	8	44
60	1	37							51	20	93
60	6	129							59	15	31
65	1	23							59	18	31
65	3	13							69	15	42
65	4	31							69	20	44
65	12	20							70	1	51
65	13	41							90	1	48
65	16	13							90	2	11
65	19	18							90	7	46
150	7	60							90	10	28
150	8	25							90	24	25
150	19	12							91	2	67

ENTRY YEAR 2008 - Alternatives 3, 5, 6 (continued)											
Site Preparation for Hardwood			**Site Preparation for Pine**			**Plant Pine**			**Thin**		
Compt.	**Stand**	**Acres**	**Compt.**	**Stand**	**Acres**	**Compt.**	**Stand**	**Acres**	**Compt.**	**Stand**	**Acres**
150	20	21							91	4	35
150	23	6							91	5	26
150	24	10							101	2	30
151	9	16							101	7	164
151	10	72							104	7	28
151	11	84							119	5	20
151	16	19							136	13	42
151	22	5							139	2	38
151	24	5							139	18	20
151	39	32							139	21	17
151	56	1							140	4	34
Total Acres		**1396**							140	9	31
									140	12	36
									143	8	5
									143	9	26
									143	11	51
									143	21	22
									152	10	30
									152	25	43
									153	15	10
									154	19	30
									157	19	19
									157	22	18
									160	10	68
									160	17	32
									160	24	54
									160	26	22
									160	26	18
									160	30	24
									Total Acres		**2170**

ENTRY YEAR 2009 - Alternatives 3, 5, 6								
Site Preparation for Hardwood			Site Preparation for Pine			Plant Pine		
Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres
						8	5	5
						8	13	1
						8	14	2
						8	14	6
						8	23	137
						8	32	54
						126	15	11
						126	19	14
						130	1	31
						Total Acres		**261**

Tentative/Planned Schedule of Treatments for Alternative 4

ENTRY YEAR 2004 – Alternative 4

Site Preparation for Hardwood		
Compt.	**Stand**	**Acres**
21	1	12
21	3	96
21	4	24
21	4	20
21	5	7
21	5	8
21	11	41
124	2	32
124	3	16
124	5	35
124	8	41
124	11	19
124	16	99
124	16	89
124	20	17
124	20	18
124	20	15
132	5	11
132	6	37
132	7	13
132	8	15
132	15	13
132	17	15
159	1	7
159	9	3
164	15	10
166	19	6
166	20	7
166	20	6
166	20	24
166	21	1
Total Acres		**757**

Site Preparation for Pine		
Compt.	**Stand**	**Acres**
160	10	15
160	25	18
160	26	6
Total Acres		**39**

Plant Pine		
Compt.	**Stand**	**Acres**

Thin		
Compt.	**Stand**	**Acres**
15	10	28
15	11	45
16	1	10
16	1	66
16	5	25
17	13	41
32	1	25
32	3	18
32	8	8
32	14	33
32	15	31
32	18	43
68	13	42
92	10	67
124	20	78
148	10	69
148	15	36
148	15	11
148	6(46)	34
157	10	32
159	9	22
163	26	32
163	30	13
163	39	27
164	4	45
164	20	33
Total Acres		**914**

ENTRY YEAR 2005 - Alternative 4											
Site Preparation for Hardwood			Site Preparation for Pine			Plant Pine			Thin		
Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres
5	18	16				160	10	15	18	4	45
5	30	11				160	25	18	18	4	11
6	13	11				160	26	6	18	7	28
7	10	38				**Total Acres**		**39**	18	11	33
7	10	17							19	3	24
20	5	22							19	9	29
20	9	13							31	14	78
20	27	11							31	14	6
20	27	13							31	19	55
22	17	17							33	3	44
22	26	33							33	10	27
23	6	35							34	5	29
23	15	28							34	14	37
23	15	14							34	22	38
24	1	13							35	23	25
33	14	11							38	3	34
36	8	67							38	7	29
36	10	32							38	11	19
36	14	21							43	6	91
37	2	17							43	20	50
37	10	11							94	1	4
37	13	13							94	7	32
37	15	15							94	11	84
37	16	23							95	2	38
48	1	21							95	7	33
48	3	12							95	12	18
49	20	31							95	14	71
51	8	18							95	20	86
51	11	23							95	24	29
52	13	10							95	35	2
52	27	11							116	6	24
70	10	136							116	8	79
70	15	43							116	8	1
70	23	41							128	3	32
70	28	19							128	10	34
76	18	55							128	12	57
76	26	30							128	19	46
77	3	22							131	12	27
77	6	12							131	16	41
81	5	53							132	3	12
81	5	23							132	5	29
81	6	21							132	10	43
125	15	29							132	17	15

ENTRY YEAR 2005 – Alternative 4 (continued)											
Site Preparation for Hardwood			**Site Preparation for Pine**			**Plant Pine**			**Thin**		
Compt.	**Stand**	**Acres**	**Compt.**	**Stand**	**Acres**	**Compt.**	**Stand**	**Acres**	**Compt.**	**Stand**	**Acres**
126	1	17							165	20	24
126	3	37							165	24	49
126	15	11							165	25	30
126	17	10							166	23	37
126	19	14							166	30	144
127	16	18							166	31	23
134	1	14							166	32	6
136	15	58							**Total Acres**		**1882**
136	19	13									
137	16	26									
137	18	43									
138	1	49									
138	11	48									
149	8	10									
152	11	17									
Total Acres		**1497**									

ENTRY YEAR 2006 – Alternative 4											
Site Preparation for Hardwood			**Site Preparation for Pine**			**Plant Pine**			**Thin**		
Compt.	**Stand**	**Acres**	**Compt.**	**Stand**	**Acres**	**Compt.**	**Stand**	**Acres**	**Compt.**	**Stand**	**Acres**
9	5	76	159	1	23				8	7	24
10	11	23	**Total Acres**		**23**				8	9	50
10	15	32							8	12	44
15	13	44							8	14	51
15	24	41							8	23	17
16	1	10							8	23	29
16	1	21							8	23	12
32	1	17							8	32	55
32	4	47							8	32	35
32	6	19							76	31	15
32	8	15							76	36	22
46	3	39							76	48	9
46	6	14							76	49	39
90	10	12							78	14	136
90	10	22							80	17	30
90	16	12							125	38	124
90	16	12							126	5	41
90	19	21							126	15	15
90	20	46							126	15	72
90	24	18							126	21	23

ENTRY YEAR 2006 – Alternative 4 (continued)											
Site Preparation for Hardwood			**Site Preparation for Pine**			**Plant Pine**			**Thin**		
Compt.	**Stand**	**Acres**	**Compt.**	**Stand**	**Acres**	**Compt.**	**Stand**	**Acres**	**Compt.**	**Stand**	**Acres**
91	4	12							126	23	71
91	6	21							126	26	34
92	4	12							126	31	35
92	13	34							126	49	8
92	13	27							130	1	31
92	24	15							130	7	29
93	5	14							130	12	57
93	11	11							130	20	39
93	11	10							149	6	4
96	11	11							149	6	21
104	7	18							149	7	44
116	3	20							149	17	80
116	6	13							149	18	33
117	3	11							149	19	82
117	20	15							150	2	23
117	20	87							150	4	44
118	6	23							150	4	41
118	11	96							150	7	3
118	25	45							150	10	36
119	11	42							151	21	32
119	16	20							151	24	7
119	19	11							151	29	10
119	21	29							161	1	8
129	5	2							161	2	14
129	5	7							161	6	49
129	15	10							161	9	100
130	1	31							**Total Acres**		**1778**
131	12	10									
133	2	86									
133	9	46									
133	17	40									
148	15	11									
148	20	36									
148	22	9									
148	37	14									
Total Acres		**1440**									

ENTRY YEAR 2007 – Alternative 4

Site Preparation for Hardwood			Site Preparation for Pine			Plant Pine			Thin		
Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres
18	4	65				159	1	23	20	4	19
18	17	10				Total Acres		23	20	5	4
38	1	31							20	5	8
38	5	21							20	8	19
38	7	46							20	9	32
38	11	33							20	11	47
39	27	27							20	21	26
39	29	17							20	22	32
39	31	25							20	27	5
39	32	22							30	2	28
42	12	16							30	8	33
42	22	12							30	14	36
42	27	13							36	14	32
42	33	16							37	7	30
43	4	70							37	10	33
43	6	14							37	13	19
43	6	41							37	13	4
66	2	10							44	1	31
66	3	19							44	13	15
66	7	63							45	13	41
66	7	10							45	17	22
67	6	16							47	11	45
67	11	16							49	6	28
67	12	34							50	6	43
68	6	70							50	18	25
68	8	27							52	10	28
68	11	13							52	13	21
69	22	105							52	14	9
94	1	47							52	16	91
94	2	19							52	17	35
94	7	35							52	23	23
94	11	23							52	27	7
94	11	12							52	27	17
95	11	32							52	36	22
121	5	35							52	41	22
121	18	14							52	42	18
139	1	15							53	11	87
139	5	31							53	13	32
139	6	16							67	3	25
139	13	26							117	6	9
139	13	17							117	14	86
139	17	11							118	5	57
139	19	12							118	5	2
139	22	52							121	20	13

ENTRY YEAR 2007 – Alternative 4 (continued)

Site Preparation for Hardwood			Site Preparation for Pine			Plant Pine			Thin		
Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres
139	22	12							122	2	36
139	26	22							122	3	11
143	21	11							122	16	25
150	7	60							122	24	9
150	8	3							127	21	66
150	8	22							129	15	31
150	19	12							129	26	53
150	20	21							133	17	79
150	23	6							141	20	53
150	24	10							163	20	38
Total Acres		**1438**							163	22	54
									170	29	20
									170	33	25
									170	36	23
									170	49	20
									171	3	22
									171	26	59
									171	34	39
									Total Acres		**1924**

ENTRY YEAR 2008 – Alternative 4

Site Preparation for Hardwood			Site Preparation for Pine			Plant Pine			Thin		
Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres
8	5	5	149	4	5				9	2	74
8	7	11	149	5	16				9	5	13
8	13	1	149	19	39				9	7	26
8	14	2	150	4	8				10	6	75
8	14	6	150	4	12				10	10	38
8	22	43	151	33	15				10	11	9
8	23	137	151	49	11				22	9	32
8	32	54	**Total Acres**		**106**				22	19	30
29	3	25							22	23	50
45	2	61							22	27	40
45	4	11							22	29	20
45	4	28							23	15	4
45	4	10							23	15	117
53	5	56							24	12	33
53	11	29							51	3	14
53	13	13							51	8	44
54	10	32							51	20	93
55	6	19							59	15	31
55	9	20							59	18	31

ENTRY YEAR 2008 – Alternative 4 (continued)											
Site Preparation for Hardwood			Site Preparation for Pine			Plant Pine			Thin		
Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres
55	12	19							69	15	42
55	14	15							69	20	44
55	15	74							70	1	51
57	9	29							90	1	48
57	11	95							90	2	11
57	14	11							90	7	46
57	14	45							90	10	28
59	4	69							90	24	25
59	13	13							91	2	67
59	14	54							91	4	35
60	1	37							91	5	26
60	6	129							101	2	30
65	1	23							101	7	164
65	3	13							104	7	28
65	4	31							119	5	20
65	12	20							136	13	42
65	13	41							139	2	38
65	16	13							139	18	20
65	19	18							139	21	17
151	9	16							140	4	34
151	10	72							140	9	31
151	11	84							140	12	36
151	16	19							143	8	5
151	22	5							143	9	26
151	24	5							143	11	51
151	39	32							143	21	22
151	56	1							152	10	30
163	26	14							152	25	43
Total Acres		1560							153	15	10
									154	19	30
									157	19	19
									157	22	18
									160	10	68
									160	17	32
									160	24	54
									160	26	22
									160	26	18
									160	30	24
									Total Acres		2129

ENTRY YEAR 2009 – Alternative 4								
Site Preparation for Hardwood			Site Preparation for Pine			Plant Pine		
Compt.	Stand	Acres	Compt.	Stand	Acres	Compt.	Stand	Acres
						149	4	5
						149	5	16
						149	19	39
						150	4	8
						150	4	12
						151	33	15
						151	49	11
						Total Acres		**106**

Recreation Resources of the Bankhead National Forest

Clear Creek Recreation Area

This area is highly developed and located on Smith Lake at the southern end of the forest. It offers 102 campsites with electricity, water, tables, grills, lantern posts, tent gravel, paved sites for trailers or recreation vehicles, spacious bath houses with warm showers, a playground, camper boat launch and paved bicycle trail. There are also 2 group camping areas where families can bring tents and find some privacy away from the remaining camp loops. The Day Use Area offers a swimming area with depth markers and a sand beach, 55 picnic tables, a 2.5 mile hiking trail (Raven Trail), a paved bicycle trail along the lake shore, bank fishing opportunities, drinking fountains and bath houses with cool showers. There are also three group shelters ideal for birthdays, reunions and meetings; these can be reserved. Permits, information and assistance are available at the entrance station (205 384-4792) and at the host sites located in each camping loop. The entire recreation area is managed under a special use permit to the Cradle of Forestry In America Interpretive Association with oversight by the USDA Forest Service.

Corinth Recreation Area

This area is the newest and most highly developed recreation area on the forest. It is located on Smith Lake just east of Double Springs. It offers 52 campsites with full hookups - electricity, water, sewage, tables, grills, lantern posts, paved sites for trailers or recreation vehicles, spacious bath houses with warm showers, a play area, camper boat launch and overflow parking. There are also 8 tent camping areas that were renovated from the old Corinth Campground; unique rock walls from the old days were incorporated into these sites. The Day Use Area offers a swimming area with depth markers and a sand beach, and 29 picnic tables scattered through the pine and hardwood forest overlooking the lake. There are bank fishing opportunities, drinking fountains and a bath house with cool showers at the beach. In addition, there is a group shelter (100 person capacity) ideal for birthdays, reunions and meetings; it can be reserved. Permits, information and assistance are available at the entrance station (205 489-3165) and at the host sites located in each camping loop. The entire recreation area is managed under a special use permit to the Cradle of Forestry In America Interpretive Association with oversight by the USDA Forest Service.

Houston Recreation Area

This developed recreation area is located on Smith Lake east of Double Springs. The campground has three loops that with 88 campsites in a rustic setting. The shady sites are great for tent camping. Each site has a grill, lantern post, table and tent gravel. Drinking water hydrants are scattered throughout the loops and bath houses provide warm showers. A 2.8 mile hiking trail connects the three camping loops with the day use area. The Day Use Area has a swimming area with depth markers and a sand beach and 14 picnic tables. Visitors can also launch a boat the ramp to Smith Lake or enjoy bank fishing opportunities. There is a group shelter ideal for birthdays, reunions and meetings; it can be reserved. Permits, information and assistance are available at the self service information boards, the Ranger District Office in Double Springs (205 489-5111) and at the host site located in the Fox Run camping loop.

Brushy Lake Recreation Area

This developed recreation area is located in the center of the Bankhead National Forest, near the Pinetorch Community. The campground has 13 campsites in a rustic setting adjacent to a 33 acre lake. The shady sites are great for tent camping. Each site has a grill, lantern post, table and tent gravel. Drinking water is available during the spring, summer and fall. There are two toilet facilities, one serving the campground year round (a non-flushing SST "sweet smelling toilet") and one serving the day use area – it provides showers except when closed in the winter season.

The Day Use Area has 20 picnic sites and a paved trail along the lake – with fishing areas and an accessible pier. There is also a boat ramp for non-motorized boats and canoes. Permits, information and assistance are available at the self service information boards and at the Ranger District Office in Double Springs (205 489-5111).

Flint Creek Multiple Use Trails

There are two loops providing opportunity for 16.5 miles of trail use. Trails are open for all terrain vehicles (commonly called 4 wheelers), motorcycles, mountain bikes, horses and hikers. At the self service trailhead, you can find permits, information, ample parking and a toilet.

Hunting

The general forest area of the Bankhead is used by hunters pursuing turkey, deer, squirrels, rabbits, quail, raccoons and wild hogs. State regulations control seasons, bag limits and methods. Hunters use archery, firearms, primitive firearms and dogs in various seasons. Management of vegetation is the primary tool for improving hunting opportunities.

Black Warrior Wilfdlife Management Area

This area (WMA), located in the heart of the Bankhead National Forest, is a favorite with hunters. It is 97,642 acres managed cooperatively by the USDA Forest Service and the Alabama Department of Wildlife and Fisheries Resources. The Sipsey Wilderness (25,002 acres) lies within the SMA. Management includes wildlife population surveys, wildlife habitat improvement including food openings, and collecting data on harvested animals. Regulations governing hunting are different from the reminder of the national forest and counties. The primary species hunted are the white-tailed deer and eastern wild turkey. In the 2002-2003 season, 4411 hunter days were registered for the deer hunts and 130 deer were harvested. Fifty-one (51) turkeys were harvested with 672 hunter days recorded for the 2003 spring season.

Owl Creek Non-Motorized Trails

There are three inter-connected loops that provide 24.9 miles of non-motorized trail use in the central part of the Bankhead National Forest. These trails are open to hikers, horse riders and mountain bikers. These trails are reached through the Owl Creek Horse Camp and the Pinetorch Trailhead. The Owl Creek Horse Camp has a toilet (SST) and hitch racks. It is being considered for upgrade and expansion. A waterline grant and cooperative project with Lawrence County is expected to provide water to the camp by 2004. This trail network is located in Area 2 of the proposed action.

Hurricane Shooting Range

The Hurricane Shooting range has a firearms range with 4 shooting benches that accommodate 2 shooters each. One of these benches is fully ADA compliant. There is an archery range that remains closed because of damage from southern pine beetle activity. A toilet (SST) and paved trail are also a part of the area.

Sipsey River Recreation Area

The Sipsey River Recreation Area is located on the Sipsey Wild and Scenic River at the southern edge of the Sipsey Wilderness. The recreation area has walking trail approximately ½ mile in length that accesses a group shelter built by the Civilian Conservation Corps in the 1930's. The trail follows along a beautiful bluff line with large hemlocks and poplar trees. Several waterfalls and the Sipsey River are easily seen from this trail. A canoe launch serves the floaters – most use occurs from January through May. Twelve (12) picnic tables are scattered throughout the area. Toilet facilities are available in the nearby Sipsey Wilderness Trailhead.

Sipsey Wilderness Area

At 25,002 acres, the Sipsey Wilderness Area is the second largest wilderness within the Southern Region of the USDA Forest Service. There are 8 trails (33.4 miles) that are open for hiking only, mostly following the streams and hardwood forests in the wilderness. In addition, 4 routes (13.3 miles) are open for horse, wagon and hiking use; these routes are former roads and mostly follow ridges and wind between drainages. The Sipsey has 6 trailheads (Sipsey River, Randolph, Thompson, Gum Pond, Braziel and Borden) that provide trailhead information and parking for visitors.

McDougle, Wolfpen & Allred Hunter Camps

Three camps are designated hunter camps. Hunters who camp during the deer firearms season are required to camp in one of these camps. These camps are available for others to use throughout the year. There are no facilities or developed sites at these camps, except for a toilet (SST) at McDougle Camp.

Biological Assessment

of

Proposed, Threatened, Endangered and Candidate Species

Forest Health and Restoration Project

Bankhead National Forest

Lawrence, Winston and Franklin Counties, Alabama

Introduction

This Biological Assessment (BA) summarizes and documents the process and makes determinations regarding the effects on the Proposed, Endangered, Threatened and Candidate species of the Bankhead National Forest for management activities as proposed within the Forest Health and Restoration Project.

A Biological Assessment, in coordination with formal consultation with the Fish and Wildlife Service, is required for proposed U.S. Forest Service management actions that have the potential to effect Proposed, Threatened, Endangered and Candidate Species.

Forest Service Manual 2670.31, requires the Forest Service through the biological evaluation process to review actions and programs authorized, funded, or carried out to determine their potential for effect upon threatened and endangered species and species proposed for listing. In addition, the Forest Service shall initiate consultation with the Fish and Wildlife Service when the agency determines that proposed activities may have an effect on threatened or endangered species; is likely to jeopardize the continued existence of a proposed species; or result in the destruction or adverse modification of critical or proposed critical habitat. In conjunction with the regulatory agencies, actions should be taken to identify and prescribe measures to prevent adverse modification or destruction of critical habitat and other habitats essential for the conservation of endangered, threatened and candidate species.

Method of Species Selection and Analysis

The most recent list of species from the Fish and Wildlife Service, the current Regional Forester's Sensitive Species list and databases maintained by the Forest Service were reviewed to develop a list of federally listed species of potential concern for the Bankhead National Forest. Further refinement was done by an examination of distribution maps and habitat data for various species. Species were excluded from further consideration only if there was a high degree of certainty that the species does not continue to inhabit Forest Service lands within Bankhead National Forest. Species considered to be extinct are not included but species that inhabit nearby areas are retained for analysis. In addition, the distribution and occurrence of rare communities were reviewed for their potential to harbor listed species.

Species are included in detailed effects analysis if they are known or likely to inhabit the Bankhead National Forest. Species are also discussed if suitable habitat is present and the species is known or likely to inhabit nearby areas.

FEDERALLY LISTED SPECIES – BANKHEAD NATIONAL FOREST

A list of Proposed, Threatened, Endangered and Candidate species known, or suspected, to occur, on or near, one or more of the management units comprising the Bankhead National Forest are as follows:

Table BA.A - Federally Listed Terrestrial Animals

Scientific Name	Common Name	Federal Status[1]	Occurrence [2]
Myotis grisescens	Gray bat	E	R
Myotis sodalis	Indiana bat	E	R
Haliaeetus leucocephalus	Bald eagle	T	R
Picoides borealis	Red-cockaded woodpecker	E	X

[1] **Status: E = endangered; T = threatened; P = proposed; C = candidate; TSA = threatened due to similar appearance; S = sensitive (USFS, Southeast Region)** It should be noted that some species are listed which have historical occurrence in the vicinity of National Forest lands, are located on private lands within the admistrative boundaries, or are known to occur in one of the counties unit occurs within. [2] **Occurrence: R**= Indicates species is acknowledged as known to be present (presence may be only migrational stopover, post-breeding dispersal, etc., or presence may be as seasonal or year-round resident), high potential for presence, or presence is known from near/adjacent lands, and presumed to be present on National Forest Management Unit. **X =** Species is Not Known, Historic, Extirpated, or Outside of Range on Management Unit.

Table BA.B - Federally Listed Aquatic Animals

Scientific Name	Common Name	Federal Status[1]	Occurrence[2]
Sternotherus depressus	Flattened musk turtle	T	R
Epioblasma metastriata	Upland combshell	E	X
Epioblasma turgidula	Turgid blossom pearly mussel	E	X
Epioblasma brevidens	Cumberlandian combshell	E	X
Lampsilis altilis	Fine-lined pocketbook	E	R
Lampsilis orbiculata	Pink mucket (pearlymussel)	E	X
Lampsilis perovalis	Orange-nacre mucket	T	R
Medionidus acutissimus	Alabama moccasinshell	T	R
Medionidus parvulus	Coosa moccasinshell	E	X
Pleurobema furvum	Dark pigtoe	E	R
Pleurobema perovatum	Ovate clubshell	E	X
Pleurobema plenum	Rough pigtoe	E	X
Ptychobranchus greeni	Triangular kidneyshell	E	R
Necturus alabamensis	Black Warrior waterdog	SC	R

[1] **Status: E = endangered; T = threatened; P = proposed; C = candidate; TSA = threatened due to similar appearance; S = sensitive (USFS, Southeast Region)** It should be noted that some species are listed which have historical occurrence in the vicinity of National Forest lands, are located on private lands within the admistrative boundaries, or are known to occur in one of the counties unit occurs within.
[2]**Occurrence: R =** Indicates species is acknowledged as known to be present (presence may be only migrational stopover, post-breeding dispersal, etc., or presence may be as seasonal or year-round resident), high potential for presence, or presence is known from near/adjacent lands, and presumed to be present on National Forest Management Unit. **X =** Species is Not Known, Historic, Extirpated, or Outside of Range on Management Unit.

Table BA.C - Federally Listed Aquatic and Terrestrial Plants

Scientific Name	Common Name	Status[1]	Occurrence[2]
Dalea foliosa	Leafy prairie clover	E	R
Helianthus eggertii	Eggert's sunflower	T	R
Lesquerella lyrata	Lyrate bladder-pod	T	X
Marshallia mohrii	Mohr's Barbara's buttons	T	R
Sagittaria secundifolia	Kral's water-plantain	T	R
Thelypteris pilosa var al.	Alabama streak-sorus fern	T	R
Xyris tennesseensis	Tennessee yellow-eyed grass	E	R
Leavenworthia crassa	Fleshy-fruit gladecress	SC	R
Platanthera integrilabia	White fringeless orchid	SC	R

[1] **Status: E = endangered; T = threatened; P = proposed; C = candidate; TSA = threatened due to similar appearance; S = sensitive (USFS, Southeast Region)** It should be noted that some species are listed which have historical occurrence in the vicinity of National Forest lands, are located on private lands within the admistrative boundaries, or are known to occur in one of the counties unit occurs within.
[2]**Occurrence: X =** Indicates species is acknowledged as known to be present (presence may be only migrational stopover, post-breeding dispersal, etc., or presence may be as seasonal or year-round resident), high potential for presence, or presence is known from near/adjacent lands, and presumed to be present on National Forest Management Unit**. X =** Species is Not Known, Historic, Extirpated, or Outside of Range on Management Unit.

I. EXPLANATION OF DETERMINATIONS

Determinations and the Needed Follow-up Actions: The determination of effects for Federally Listed Species are: 1) No Effect; 2) Is not likely to adversely affect; 3) Is likely to adversely affect. All the possible effects can and should be included within one of the above determinations. The needed follow-up actions vary depending on the type of species and the determination.

A **"no effect"** determination should be used when the proposed actions have no effects on the proposed, endangered, threatened and sensitive or locally rare (PETS) species or critical habitat. No follow-up action is required for this determination.

A determination of "**is not likely to adversely affect**" should be used for discountable, insignificant or beneficial effects. If the determination of "is not likely to adversely affect," written concurrence is required from the FWS for both proposed and listed species.

Discountable effects are those extremely unlikely to occur. Based upon best judgment, a person would not be able to meaningfully measure, detect or evaluate insignificant effects.

Insignificant effects relate in size of the impact and should never reach the scale where take occurs.

Beneficial effects are positive effects without any adverse effect to the species.

A determination of "**is likely to adversely affect** " should be used if any adverse effect to a listed species may occur as a direct or indirect result of the proposed action. If the determination is "likely to adversely affect" and the species is proposed for listing, conference with the FWS is required. If the determination of "is likely to adversely affect" and the species is listed as threatened or endangered, formal consultation with the FWS is required by Endangered Species Act of 1973 as amended, (ESA), section 7.

Conference is a legally required "informal consultation" with the FWS. If the determination is "likely to adversely affect" and the species is listed as threatened or endangered, Formal Consultation with the FWS is required. All requests to initiate Formal Consultation must be sent through the Regional Forester. With sensitive species, follow-up action with the FWS is not required for any determination of effects. No action is required for determinations of "no effect" or "beneficial impacts." For "may impact individuals but not likely to cause a trend to federal listing or loss of viability," mitigating measures that will minimize the negative impacts should be developed. If the determination is "likely to result in trend to federal listing, or loss of viability," the proposed actions should be modified so that one of the other 3 determinations is appropriate. Sensitive species must receive special management emphasis to ensure their viability and to preclude the need for Federal listing.

II. FEDERALLY LISTED (T & E) SPECIES

This section provides information on the determinations of effects on federally listed plant and animal species on the Bankhead National Forest. Other federally listed species are not discussed due to lack of presence in the geographical area, unsuitable habitat conditions, and/or lack a "high probability of occurrence" on national forest lands.

II. A. FEDERALLY LISTED TERRESTRIAL ANIMALS

- Red-cockaded woodpecker *(Piciodes borealis)* – E
- Bald eagle *(Heliaeetus leucocephalus)* - T
- Gray bat *(Myotis grisescens)* - E
- Indiana bat *(Myotis sodalis)* - E

II. A. 1. Red-cockaded woodpecker *(Piciodes borealis)*

II. A. 1. a. Environmental Baseline

The red-cockaded woodpecker (*Picoides borealis*) is a federally listed endangered species endemic to open, mature and old–growth pine ecosystems in the southeastern United States. The red-cockaded woodpecker was listed as endangered in 1970 (35 Federal Register 16047) and received federal protection under the Endangered Species Act of 1973. The precipitous decline in population size that led to the species' listing was caused by an almost complete loss of habitat. Fire-maintained old-growth pine savannas and woodlands that once dominated the southeast, no longer exist except in a few, isolated, small patches. Longleaf pine (*Pinus palustris*) ecosystems, of primary importance to red-cockaded woodpeckers, are now among the most endangered ecosystems on earth. Shortleaf (*P. echinata*), loblolly (*P. taeda*), and slash pine

(*P. elliottii*) ecosystems, important to red-cockaded woodpeckers outside the range of longleaf, also have suffered severe declines (USFWS, 2000).

In 1986, nine populations of red-cockaded woodpeckers existed on National Forest lands in Southern Appalachian Forests (Costa and Escano, 1989). Red-cockaded woodpecker populations were on Bankhead NF at that time but were extirpated by 1992. In 1986 the Bankhead National Forest had one active cluster with a very small population.

Unlike earlier declines that led to the species' listing, these extirpations were not the result of timber harvesting. Two trends account for these later population extirpations: first, a loss of the two-layered, (open pine canopy and herbaceous groundcover) forest structure; followed by a loss of the pine-dominated forest composition, required by red-cockaded woodpeckers. Hardwood midstory within active clusters has been associated with cluster abandonment (Loeb et al. 1992). These extirpations were the result of unimpeded succession, through a lack of adequate burning and thinning in pine and pine-hardwood stands. Fire suppression has severe and numerous impacts on southern pine ecosystems, including changes in tree species composition and forest structure (USFWS, 2000).

Currently there are no known populations of red-cockaded woodpecker remaining on the Bankhead National Forest or adjacent private lands. For this reason no further evaluations for this species will be performed.

II. A. 1. b. Determination of Effect

Because this species no longer occurs in the area and is not known to nest, have roosts or have permanent habitat on Bankhead National Forest or adjacent lands, the Forest Health and Restoration Project and alternatives will have **"No Effect"** on the red cockaded woodpecker.

II. A. 2. **Bald eagle** (Heliaeetus leucocephalus)

II. A. 2. a. Environmental Baseline

The bald eagle ranges over most of the North American continent, from as far north as Alaska and Canada, down to Mexico. Experts believe that in 1782 when the bald eagle was adopted as our national bird, their numbers may have ranged from 25,000 to 75,000 nesting pairs in the lower 48 states. Since that time the species has suffered from habitat destruction and degradation, illegal shooting, and most notably from contamination of its food source by the pesticide DDT. In the early 1960's, only 417 nesting pairs were found in the lower 48 states. In 1999, more than 5,748 nesting pairs of bald eagles were recorded for the same area, resulting primarily from the banning of DDT in the United States in 1972 aided by additional protection afforded under the Endangered Species Act (USDI, Fish & Wildlife Service, 1999).

Bald eagles have few natural enemies but usually prefer an environment of quiet isolation from areas of human activity (i.e. boat traffic, pedestrians, or buildings), especially for nesting. Their breeding areas are generally close to coastal areas, bays, rivers, lakes, or other bodies of water that reflect general availability of primary food sources including fish, waterfowl, rodents, reptiles, amphibians, seabirds, and carrion (Andrew and Mosher 1982, Green 1985, Campbell et al. 1990). Although nesting territory size is variable, it typically may encompass about 2.59 square kilometers (Abbott, 1978). Most nest sites are found in the midst of large wooded areas adjacent to marshes, on farmland, or in logged-over areas where scattered seed trees remain (Andrew and Mosher, 1982). The same nest may be used year after year, or the birds may alternate between two nest sites in successive years. Bald eagles mate for life and are believed to live 30 years or more in the wild. Although bald eagles may range over great distances, they usually return to nest within 100 miles of where they were raised (USDI, Fish & Wildlife Service, 1995).

Winter home ranges for eagles can be very large, especially for non-breeding birds. They generally winter throughout the breeding range but are more frequent along the coast. These birds commonly roost communally. The Bald Eagle was a locally common, breeding and wintering resident in Alabama, on the Gulf Coast and in the Tennessee Valley before 1960 (Imhof, 1976). Today the species is a rare to uncommon breeding and wintering resident. There have been confirmed sightings on the Bankhead National Forest, usually around large bodies of water such as Lewis Smith Lake. There are no known nests within the area, nor have any been recorded in the area within the recent past.

The primary threats to the bald eagle include loss of nesting, foraging, and roosting habitat especially along shorelines, disturbance by humans, biocide contamination, decreasing food supply, and illegal shooting (Byrd and Johnstone, 1991, Buehler, D.A., et al, 1991). Bald eagles also have died from lead poisoning as a result of feeding on waterfowl that had inadvertently ingested lead shot. In 1991, the U.S. Fish and Wildlife Service completed a program to phase out lead shot for waterfowl hunting.

II. A. 2. b. Direct, Indirect, and Cumulative Effects

Timber harvesting or road building activities have the potential to impact the bald eagle or its habitat should this activity occur near lakes or other potential habitat. Human disturbance from roads and similar activities can also adversely affect the use of an area for nesting or roosting by eagles.

A standard 1500 foot protection zone around bald eagle nests and communal roost sites is generally accepted by resource agencies as an adequate buffer. This would be recognized if a nest were found. Vegetation management that would affect forest canopy within these zones is prohibited, and other activities that may disturb eagles are prohibited within these zones during periods of use. The emphasis on low levels of disturbance and maintenance of riparian areas of mature forest, provides direction for management of shorelines where bald eagles may forage. No additional specific provisions related to foraging habitat are necessary; due to the variety of circumstances that may be involved, these issues would be addressed during site-specific analysis.

II. A. 2. c. Determination of Effect

Because this species is only a temporary migrant and is not known to nest, have roosts or have permanent habitat on Bankhead National Forest, the Forest Health and Restoration Project and alternatives are **"not likely to adversely affect"** the bald eagle, and should provide conditions beneficial to this species.

II. A. 3. **Gray bat** (Myotis grisescens)

II. A. 3. a. Environmental Baseline

The gray bat occupies a limited geographic range in limestone karst areas of the southeastern U.S. (USDI FWS 1982). The bat is more narrowly restricted to cave habitats than any other mammal occurring in the U.S., and occupies caves year-round. Most individuals migrate seasonally between maternity and hibernating caves. About 95% of the known population inhabits nine winter caves.

Limiting factors for the gray bat may include cold caves in the southern portion of its range. A key cause of decline appears to be human disturbance and loss of cave habitat quality. The recovery plan (USDI FWS 1982) recommends actions focused on cave gating.

Deforestation of areas around occupied cave entrances and in between caves and large water sources (feeding corridors) may have a detrimental effect. Forest cover provides protection from predators, especially for young bats. Retention of forested corridors around cave entrances, along river and perennial stream edges, and along reservoir shorelines within 25 km of known gray bat maternity caves is important for species protection (USDI FWS 1982; LaVal et al. 1977; Best et al. 1995).

Although the gray bat is currently listed as endangered, some bat researchers have endorsed a proposed status change to threatened status (down-listing) due to population increases and successful protection of many inhabited caves (Currie and Harvey 2002). Gray bats are now estimated to number over 2.6 million individuals.

Both major hibernacula and important maternity caves are known from Alabama and Tennessee. However, those caves are over 50 miles from the nearest Forest Service management unit. Small numbers of gray bats are known to hibernate in two caves on Bankhead National Forest. No maternity sites are known or have been found to exist on or within the proclamation boundary.

II. A. 3. b. Direct, Indirect, and Cumulative Effects

Possible effects under any or all alternatives of the Forest Health and Restoration Project include alteration of forest cover through various management activities. There is opportunity for impacts to the species if these activities are within close proximity to cave habitats and result in the excessive disturbance of a maternity cave during a forest management activity.

Effects to gray bat caves would be the same under all alternatives. For each alternative, existing standards of the Forest Land and Resource Management Plan or the requirements of the Biological Opinion for Indiana and gray bats (Wilson 1999) would provide a protection zone to protect all hibernacula and maternity colony sites that may be discovered.

Effects on foraging habitat are expected to be similar under all alternatives since riparian corridors will be well protected by streamside management zone guidelines. In addition, Bankhead National Forest will retain its pre-existing streamside management zone guidelines that provide protection of ephemeral drainages. These standards will not only provide forest cover for foraging and protection from predation, but will also ensure high water quality to support the aquatic insect prey base.

In general, effects to the gray bat would be similar under all alternatives, as protective mechanisms are in place. For each alternative, standards of the Forest Land and Resource Management Plan or the requirements of the Biological Opinion for Indiana and Gray Bats (Wilson 1999) would provide protection zones for all hibernacula and maternity colony sites that are known or may be discovered. Coordination with Fish and Wildlife will be done for any project site within this vicinity. All requirements related to retention of streamside management zones will be followed to protect riparian sites that may be utilized by the gray bat. For any alternative that allows active vegetation management such as site preparation activity, thinning operations or temporary road construction that occurs during the period when young are nonvolant, there is a small potential for “take”. However, standards described above would minimize the chance of take for all alternatives.

Prescribed burning plans will identify caves as potentially smoke-sensitive targets. Location of caves will be considered when planning and conducting fire line construction.

However, the benefits to this species would potentially be greater under those alternatives that provide thinning treatment to the largest acreages. The existing stands of loblolly pine that have not been thinned, provide little or no habitat for this species. If these stands are thinned, at least they have the potential to provide foraging areas.

II. A. 3. c. Determination of Effect

The Forest Health and Restoration Project and its alternatives **“may affect, not likely to adversely affect”** this species because habitat management alternatives address the critical needs for habitat and protection of the gray bat. Based upon these findings and existing requirements for habitat conservation, the selection of any alternative should maintain foraging, roosting and maternity/hibernacula habitat conditions for this species.

II. A. 4. Indiana bat *(Myotis sodalis)*

II. A. 4. a. Environmental Baseline

The distribution of Indiana bats is generally associated with limestone caves in the eastern U.S. (Menzel et al. 2001). Within this range, the bats occupy two distinct types of habitat. During summer months, maternity colonies of adult females roost under sloughing bark of dead and partially-dead trees of many species, often in forested settings (Callahan et al. 1997). Reproductive females require multiple alternate roost trees to fulfill summer habitat needs. Adults forage on winged insects within three miles of the occupied maternity roost. Swarming of both males and females and subsequent mating activity occurs at cave entrances prior to hibernation (MacGregor et al. 1999). During this autumn period, bats roost under loose, sloughing bark and in cracks of dead, partially-dead and live trees.

Wintering colonies require very specific climatic regimes within cold, humid caves primarily west of the Appalachian Mountains (Barbour and Davis 1969; Menzel et al. 2001). Few sites provide these conditions, and approximately 85% of the entire known population inhabits only nine caves or mines (Menzel et al. 2001; USDI FWS 1999).

Although most hibernacula have been protected, the Indiana bat range-wide population has declined by about 60% since the 1960’s (USDI FWS 1999). Causes of decline are not known; declines have continued despite efforts to protect all known major hibernacula. Researchers are focusing studies on land use practices in summer habitat, heavy metals, pesticides and genetic variability in attempt to find causes for the declines.

Small winter populations of Indiana bats were found in two caves on the Bankhead National Forest in February, 1999. Their presence and use of the caves has been verified in subsequent years. Monitoring efforts are ongoing by Forest Service, U.S. Fish and Wildlife Service, Alabama Department of Conservation and Natural Resources and Alabama A & M University.

Recommended habitat management includes protecting known significant hibernacula from human impacts and retaining forested condition around the entrances to significant hibernacula. (Menzel et al. 2001).

It is difficult to quantify summer roosting habitat for Indiana bat at a range-wide, regional or local level due to the variability of known roost sites and lack of knowledge about landscape scale habitat characteristics of maternity roosts. Forest management practices that affect occupied roost trees may have local impacts on Indiana bat populations. However, the bats live in highly altered landscapes, depend on an ephemeral resource, dead and dying trees, and may be very adaptable. Anecdotal evidence suggest that these bats may respond positively to some degree of habitat disturbance (USDI FWS 1999).

Research is needed on the effects of forest management on Indiana bat summer roosting ecology (Menzel et al. 2001) in Alabama. Current research efforts are seeking to establish the use of Bankhead National Forest by Indiana bats outside of the hibernation period. Research partially funded by Forest Service has documented the use of tree roosts on Bankhead National Forests in fall, prior to the winter hibernation period. No maternity roosts or summer tree roosts have been identified on Bankhead National Forest. However, there is a strong likelihood that portions of Bankhead National Forest may support summer maternity colonies (Tuttle personal communication 2001).

General practices that would help ensure adequate roost habitat include; retention of snags whenever possible; prescribed burning to restore and maintain uncluttered, open midstory foraging conditions (by thinning and using prescribed burning in cool season); and ensuring a continuous supply of oaks, hickories, and ash as well as other trees with exfoliating bark (Menzel et al. 2001).

II. A. 4. b. Direct, Indirect, and Cumulative Effects

In general, effects to this species would be similar under all alternatives. For each alternative, standards of the Forest Land and Resource Management Plan or the requirements of the Biological Opinion for Indiana and Gray Bats (Wilson 1999) would provide protection zones for all hibernacula and maternity colony sites that are known or may be discovered. Coordination with Fish and Wildlife will be done for any site within this vicinity. Prescribed burning plans will identify caves as potentially smoke-sensitive targets. Location of caves will be considered during planning for the prescribed burn and fire line construction. All requirements related to retention of streamside management zones will be followed to protect riparian sites that may be utilized by the Indiana bat. Trees, that are known to be utilized as roost trees will be avoided during forest management activities. All Forest Service guidelines for the retention of live trees that have high potential as roost trees, will be followed to allow for future development of habitat. For all alternatives, retention of dead snags and high priority roost trees will be required for any activity that removes tree stems such as thinning or site preparation activities. For any alternative that allows active vegetation management such as site preparation activity, thinning operations or temporary road construction that occurs during the period when young are nonvolant, there is a small potential for “take” of a maternity roost tree. However, standards described above would minimize the chance of take for all alternatives.

However, the benefits to this species would potentially be greater under those alternatives that provide thinning treatment to the largest acreages. The existing stands of loblolly pine that have not been thinned, provide little or no habitat for this species. If these stands are thinned, they have the potential to provide foraging areas.

Alternative 1 (No Action) would essentially eliminate Indiana bat use of the acreages with unthinned pine stands. These areas have too much vegetation to be useful as foraging areas for bats.

Implementation of Alternative 2 could result in the highest levels of vegetation disturbance by thinning and site preparation activity because it treats the largest acreage, over all other alternatives.

Alternatives 3, 5 and 6 would potentially provide more foraging habitat than is currently available to Indiana bats. This would be accomplished primarily by the use of thinning existing pine stands; establishing open, “woodland” conditions that allow a maximum area above, between and over the canopy for foraging bats; and prescribed burning to maintain the insect rich herbaceous/shrub community below the forested overstory. Properly implemented prescribed burns have potential to provide beneficial effects including improvement of foraging habitat conditions and creation of additional snag roosts. The flame lengths of dormant season prescribed burns are not likely to have a direct effect on roost trees, and Indiana bats would be absent from the general forest area during this period. Smoke management from the burns will be such that the known caves are not directly in the path of the smoke plume and dispersion indices are in place to preclude smoke management concerns. Location of post burn smoke will also be considered during planning. Post burn smoke shall not accumulate in the drains where caves are located.

Alternative 4 would be beneficial in that it would provide for thinning of existing pine stands. It will allow restoration to hardwoods which is generally beneficial, as Indiana bats utilize mixed stands of hardwood and pine trees. This alternative has greatly reduced acreages of open, “woodland” condition stands and the use of prescribed fire is reduced as compared to alternatives 3, 5, and 6.

Considering the cumulative effects on the Indiana bat from practices within the Forest Health and Restoration Project there should be a net gain of habitat for alternatives that provide thinning of pine stands as well as provide and maintain open, "woodland" conditions. All types of vegetation treatments (thinning and site preparation) would require varying levels of snag retention and specific retention of leave trees as defined by the Forest Land Resource Management Plan and the Indiana Bat Biological Opinion of 1999.

II. A. 4. c. Determination of Effect

For alternatives 1 – 6 the determination of effect is "may effect, not likely to adversely affect" for the Indiana bat. Management direction addresses the critical needs for habitat and protection of the Indiana bat and should improve or maintain foraging, roosting and hibernacula habitat conditions for this species. The levels of vegetation management allowed within cave protection zones are not likely to diminish summer roosting or foraging habitat in a significant way. Summer roosting use on Bankhead National Forest has not been established by ongoing research efforts. However, the possibility for "take" cannot be completely eliminated with any level of management. Forestwide standards should reduce the potential for "take" to levels that are insignificant and discountable.

II. CONSOLIDATED LIST OF TERRESTRIAL T&E SPECIES WITH DETERMINATIONS

Table BA.D - Determination of Effects for Federally Listed Terrestrial Animals

Scientific Name	Common Name	Determination of Effects
Picoides borealis	Red-cockaded woodpecker	No Effect
Haliaeetus leucocephalus	Bald eagle	Not likely to adversely affect
Myotis grisescens	Gray bat	Not likely to adversely affect
Myotis sodalis	Indiana bat	Not likely to adversely affect

II. B. AQUATIC SPECIES

- Black Warrior waterdog (Necturus alabamensis) - C
- Flattened musk turtle (Sternotherus depressus) – T
- Cumberlandian combshell (Epioblasma brividens) - E
- Turgid blossom pearlymussel (Epioblasma turgidula)- E
- Pink Mucket pearlymussel (Lampsilis orbiculata) – E
- Rough Pigtoe (Pleurobemaa plenum) - E
- Upland combshell (E. metastriata) - E
- Fine-lined pocket book (Lampsilis altilus) – T
- Orange-nacre mucket (L. perovalis) – T
- Alabama moccasinshell (Medionidus acutissimus) - T
- Coosa moccasinshell (M. parvulus) - E
- Dark pigtoe (P. furvum) – E
- Ovate clubshell (P. perovatum) – E
- Triangular kidneyshell (Ptychobranchus greenii) – E

The National Forests encompass less than 3% of the state's land-mass but support more than 60% of the federally listed freshwater species. There are 13 federally listed aquatic species (T&E) including 9 endangered and 4 threatened species located on or near the Bankhead National Forest. In addition, there is 1 candidate species associated with the Bankhead National Forest. Critical habitat has been proposed for 11 freshwater mussel species on or near the Bankhead National Forest.

Most T&E species inhabit the aquatic habitats associated the 7,700 miles of streams and rivers of the Bankhead National Forest. Although most T&E species are highly specialized in their selection of micro-habitat, all species seem to have similar basic habitat requirements. Consequently, there are some commonalities of potential effects of management activities among all T&E species. All T&E species are sensitive to varying degrees to alterations in habitat structure, water quality, sediment and in less obvious ways to the quality and quantity of interaction with the riparian zone. Various practices of the Forest Health and Restoration Project potentially could impact several of these parameters.

Habitat Structure

Habitat structure is perhaps the most significant environmental factor for a wide variety of aquatic species. Habitat alterations can have adverse impacts on aquatic organisms through loss of habitat, reduction in habitat quality, and blockage of travel and re-colonization corridors (Moyle and Leidy 1992). However, due to their location, extent and intensity, proposed Forest Health and Restoration Project activities are highly unlikely to result in modifications to aquatic habitat. Road crossings are the only Forest Service activity that presently occur within and have potential to directly modify the structure of riverine and stream aquatic habitat.

With any of the potential alternatives of the Forest Health and Restoration Project only temporary roads will be constructed. No permanent road construction is planned or proposed. All streamside management zones within each treatment area will be protected in accordance with the guidelines of the Forest Land and Resource Management Plan and its amendments or its subsequent revisions. Current riparian and streamside management standards include construction precautions for use of temporary roads. Temporary roads will cross streams only on temporary bridges or low water fords. Road crossings are configured to minimize the footprint within the riparian zone. Streamside management zone standards would also apply to protect water quality. If stream-crossings are necessary, they will be constructed in accordance with above-mentioned procedures. Temporary access roads, which may be constructed, will be equipped with water bars and turn outs or will be established to vegetative cover for protection against erosion, as soon as possible, following the site activity. Log landings and loading decks will be disked, seeded, and mulched following the timber thinning activities. FS personnel will evaluate the need for additional erosion control measures with considerations made for the soil type and the percent slope of the area. Control measures include road closure, construction of water bars and turnouts, seeding, mulching and nutrient application.

Water Quality

Water quality is also a large risk factor in the viability of aquatic species. Historically, human activities ranging from forestry, residential development, industry and agriculture have contributed to alterations in water chemistry and other qualities (Abell et al. 2000). Direct effects of water quality degradation could include death of aquatic organisms due to reduction in oxygen availability, or a change in water chemistry or nutrients.

Nutrient enrichment is another category of potential water quality degradation. Forest Service activities that could contribute to nutrification include forest management activities such as thinning, prescribed burns and the use of fertilizers in soil conservation measures.

Management of forest health may decrease the likelihood of resource damaging wild fires and consequential run-off and mobilization of ash and nutrients. Minimum impact fire suppression techniques are to be used in sensitive areas and prescribed burning techniques are designed to minimize soil damage and sediment run-off through use of backing fires and stipulations on fire-line construction methods, maintenance, locations, and restoration within riparian and streamside management zones. Terrestrial fertilizers are generally limited in use for the purpose of establishing vegetation on bare soil and critically eroding areas. The current Forest Plan amendment 14 stipulates that fertilizer will only be used within streamside management zones and unscoured drains for either listed and sensitive species habitat restoration or vegetative control of non-point source pollution. Dormant season burns only remove the upper layer of leaf litter and duff, thus any mineral soil that will be exposed to soil erosion due to this activity would be minimal. Although a slight and temporary change in runoff immediately following a prescribed burn could be anticipated, it would be minor in nature as compared to that experienced with a wildfire situation. Properly managed fire should not adversely affect water quality or quantity. Any changes resulting from a prescribed burn during the dormant season would be short lived. As fire burns the surface leaf and litter layers the nutrients stored there are released. These nutrients are taken up by other plants and microorganisms or exported from the community. A recent study on the Talladega National Forest in Alabama by Auburn University compared water quality parameters in streams with thinning and prescribed burning within the watersheds. The initial findings revealed no major differences in water chemistry between managed streams (thinned and burned) and reference streams (Feminella 2000). Research from Clemson University (Van Lear) suggests that runoff concentrations of K, Ca, Mg, and Na were not significantly affected with prescribed fire. Research from Florida has demonstrated that fire will induce nitrogen fixation by soil micronutrients associated with plants and essentially replaces any nitrogen lost during the burn.

Mussels can experience minor, short-term changes with no negative effects, particularly during the winter (FWS 2000). The use of *prescribed* fire also reduces the possibility and intensity of resource damaging *wildfires*. These wildfires can result in increased sedimentation and serious changes in water chemistry due to the large area and the intense nature of occurrence. Large and intense wildfires within an watershed can have devastating effects upon aquatic ecosystems.

Conditions that occur in these situations are often characterized by high concentrations of ash and sediment entering streams to effectively eliminate much of the aquatic life.

Sediment

Sediment is identified as a key habitat feature of potential concern in many watersheds associated with the Bankhead National Forest. Management activities that mobilize fine sediments pose the largest potential affect to aquatic species. Sediment is an important factor in the suitability of aquatic habitat, but it may be less important than other factors within the Mobile River Basin largely because these systems are naturally prone to high sediment loading rates. The majority of aquatic species are largely tolerant of fine sediments. The headwater watersheds of the Bankhead National Forests support the vast majority of sediment sensitive species. Sediment mobilizing management activities are thus of great concern for the Bankhead National Forest.

Historically, most forested areas of Alabama have been impacted by intensive and extensive timber production practices of the past. Tillage for early agriculture also played a major role in the run-off of soils and siltation of waterways. Historical activities also resulted in drastic changes in channel morphology that are still evident today. Due to the overloading of sediments, some channels artificially aggraded while others down cut as a result of accelerated bank erosion. The Bankhead National Forest provides the most obvious examples of historical long-lasting channel alterations due to accelerated sediment runoff. Currently, the Forest Service engages in only a few activities that potentially could result in sediment run-off. These being practices that cause ground disturbance to the extent that soil erosion occurs.

Forestry practices within this Forest Health and Restoration Project are primarily thinning operations and site preparation activities. Thinning operations remove only a portion of the vegetative cover and disturb less areas of soil than that of a clear-cut harvest. Site preparation practices proposed within this project include the use of a drum chopper and site preparation burning. The drum chopper is perhaps the least soil disturbing mechanical method of site preparation available. Riparian and streamside zones are not included in planned thinning or site preparation areas. Responses to pest infestations have also been modified to avoid direct impacts to riparian corridors. Current management standards minimize soil disturbance within riparian habitat. Healthy well-vegetated riparian corridors provide a filtering capacity so that sediment may be trapped, deposited, and stored and less sediment reaches the stream or other water body. The direct and indirect effects of sediment transport, siltation, and turbidity, are thus expected to be minimized under all alternatives. Alternative 2 proposes the largest acreage to be treated, thus the potential for the largest amount of ground disturbance. Although other alternatives will also result in ground disturbance, it would be of lesser amounts than Alternative 2. Alternative 1 which is the no action alternative has no proposed ground disturbing practices that would result in increased sediment movement.

Riparian Interface

The importance of the riparian interface for T&E aquatic species is difficult to quantify. Reptiles and amphibians have obvious connections to riparian habitat since many species forage or reproduce within the streamside zone. Many species of reptiles and fish require riparian derived woody debris as an important component of their habitat structure. All aquatic species are tied to the riparian zone through the process of nutrient cycling.

The current Forest Plan and amendments have largely limited vegetative and silvicultural treatments within streamside and riparian zones. All work conducted as part of the Forest Health and Restoration Project will recognize these areas and their associated protection mechanisms. Sites to be thinned are primarily upland areas located on hillsides and ridges.

Similarly, the areas to be treated by site preparation and planting are located on upland areas with very little if any riparian interface. Any stream crossings would be regulated by the current forest plan and its amendments.

Summary of Effects to Aquatic Habitat and T&E Species

Overall effects of Alternatives 2-6 of the Forest Health and Restoration Project will be beneficial for aquatic habitat and T&E species (determination of no effect or not likely to adversely affect) as compared to the No Action alternative. The Forest Health and Restoration Project provides opportunities for habitat restoration and T&E species protection through contributions to recovery and conservation, participation in population and habitat enhancements and restoration and commitment to ongoing surveys and monitoring. However, there will still continue to be cumulative adverse effects and possibly some take of individuals of certain T&E species. More detailed effects analysis and species determinations are discussed as follows.

II.B.2 Black Warrior waterdog (*Necturus alabamensis)*

II. B.2.a. Environmental Baseline – Black Warrior waterdog

The Black Warrior waterdog is a candidate species under possible consideration for future federal listing. It is endemic to the upper Black Warrior River system in Alabama. Extant populations and historical habitats on or near the Bankhead National Forest are displayed in Table BA.E.

Table BA.E - Black Warrior waterdog

Overview of known or suspected Black Warrior waterdog occurrences and potential habitat within five miles of the Bankhead National Forest.

River Basin	Watersheds	Miles		Forest	Counties	Status	Viability Risk[1]		
		on	near				L	M	H
Black Warrior	Lower Brushy	13		Bankhead	Winston	Present			N
	L. Sipsey Fork	24			Winston	Present			N
	Upper Brushy	40			Winston	Present		F	
	U. Sipsey Fork	27			Lawrence	Present		F	
Total		104				Present			

[1]Viability risks: L = low, M = moderate, H = high, N = minimal FS influence, F = some FS influence

Black Warrior waterdogs are aquatic salamanders which are found in a variety of headwater and mainstem streams upstream from the influence of Lewis Smith Lake. Optimal habitat appears to be free-flowing large streams or small rivers having healthy forested streamside zones. The Sipsey Fork population contains the greatest density within its range (Durflinger 2001). They appear to require detectable flow and ample leaf packs for cover and foraging. Other factors contributing to habitat quality include a low silt load and substrate deposits, low nutrient content and bacterial counts, moderate temperatures, and minimal overall chemical pollution.

The historic decline of Black Warrior waterdog populations may be attributed to habitat modification, sedimentation, eutrophication, and other forms of water quality degradation. They are rated as currently at risk in 2 out of 4 watersheds associated with the National Forests in Alabama. In both cases, the high-risk rating is due to influences outside of Forest Service control.

Potential direct and indirect impacts to this species from management practices of the Forest Health and Restoration Project include sedimentation and its impacts to water quality. Siltation may affect this species by burying leaf packs where they seek food and cover, by reducing the availability of oxygen, and loss of prey species with limited production of aquatic insects and by coating their external gills, reducing oxygen transfer, any of which would be detrimental to their collective health and population viability. Under the current Forest Land and Resource Management Plan and its amendments, forest-wide, streamside management zone and riparian standards will protect the Black Warrior waterdog and its habitat from any sediment that might be induced during management activities. Under planned management practices, vegetation treatments have been largely limited within the streamside and riparian zones. On the Bankhead National Forest, southern pine beetle control measures have not extended to the streambanks in order to protect visual and natural resource qualities of the wild and scenic corridor along the prime Black Warrior waterdog habitat of the Sipsey Fork.

Cumulatively, several on-forest (but not necessarily Forest Service controlled) reservoirs may continue to affect populations through altered flow, chemistry, and nutrient cycling, and as barriers to movements among tributaries. Habitat protection and monitoring will be the primary conservation objectives.

Overall direction of forest management activities provided in the Forest Health and Restoration Project will be beneficial for Black Warrior waterdogs. The practices that could potentially effect the Black Warrior waterdog would be those which disturb the soil, including thinning operations, temporary road construction and site preparation activities. If soil loss levels are maintained at or below the baseline soil tolerance there should be no effect on Black Warrior waterdogs. While existing protective mechanisms are in place to protect this aquatic species it is important to prevent excessive erosion by utilizing soil conservation measures for any practice that allows erosion levels to rise above the tolerance amount. This can be done by retaining ground cover of vegetative debris on thinning operations in steep areas, reducing the use of drum chopping in steep areas and by utilizing soil conservation measures prior to closure of temporary roads. However, there may still continue to be some cumulative adverse effects including the inundation and habitat fragmentation associated with reservoirs that are outside the scope of this project.

II. B.2.b. Determination of Effect – Black Warrior waterdog

When conservation opportunities arise, they will be coordinated with the U.S. Fish and Wildlife Service and the appropriate state agency. Given these positive opportunities for pro-active conservation of the species and the protection afforded by the Forest-wide and riparian standards, it is likely that negative effects will be avoided or mitigated and minimized to a discountable and insignificant level and overall effects on the species will be beneficial. It is therefore determined that the Forest Health and Restoration Project and its alternatives **"may affect, but is not likely to adversely affect"** this species.

II. B.3 Flattened musk turtle (*Sternotherus depressus*)

II. B.3.a. Environmental Baseline -- Flattened musk turtle

The flattened musk turtle was federally listed as threatened in 1987 (USFWS 1987). It is endemic to the upper Black Warrior River system in Alabama. Historically, it inhabited 10 to 20 percent of the streams in the upper third of this river basin. Currently, it has been extirpated from over 30% of its historical range. Within the current range, only about 15 % of the habitat seems to contain healthy, reproducing populations. Extant populations and potential habitats on or near Bankhead National Forest are displayed in Table BA.F. Studies of the flattened musk turtle are currently being conducted by a cooperative effort of the Forest Service, Alabama Power Company, The Nature Conservancy and the University of Alabama at Birmingham.

Table BA.F - Flattened musk turtle

Overview of known or suspected flattened musk turtle occurrences and potential habitat within five miles of the National Forests in Alabama.

River Basin	Watersheds	Miles		Forest	Counties	Status	Viability Risk[1]		
		on	near				L	M	H
Black Warrior	Clear	11		Bankhead	Winston	unknown			N
	Lewis Smith	24				present			N
	Lower Brushy	13				dense			F
	L. Sipsey Fork	24				present			F
	U. Sipsey Fork	27				present		F	
Total		99							

[1]Viability risks: L = low, M = moderate, H = high, N = minimal FS influence, F = some FS influence

Flattened musk turtles are found in a variety of headwater streams and at scattered locations of stream inflow to Lewis Smith Lake. Optimal habitat appears to be free-flowing large streams or small rivers having vegetated shallows alternating with pools. They appear to require detectable currents and an abundance of crevices and submerged rocks for cover. Other factors contributing to habitat quality include abundant molluscan prey, a low silt load and substrate deposits, low nutrient content and bacterial counts, moderate temperatures, and minimal overall chemical pollution.

Historically, siltation, chemical pollution, and hydrological changes associated with mining, navigation, and flood control projects have had adverse effects on flattened musk turtles and their habitat (Dodd et al. 1988). The turtle is particularly vulnerable to population decline due to late sexual maturity and a low reproductive rate. They are also highly dependant on adequate molluscan prey, a taxa that is highly vulnerable to decline due to sedimentation, pollution, and habitat alteration. Since they are dependant on molluscan prey, barriers to host fish may also be a factor. According to the recent rankings based on watershed conditions, 4 out of 5 watersheds rank as a high risk for flattened musk turtle viability, largely due to factors outside of the influence of the Forest Service.

II. B.3.b. Direct, Indirect, and Cumulative Effects – Flattened musk turtle

Direct and indirect potential impacts to this species from management practices of the Forest Health and Restoration Project include sedimentation and its impacts to water quality. Siltation may effect flattened musk turtles by eliminating or reducing their mollusk food supplies, altering the rocky habitats where they seek food and cover or by reducing the quality and availability of nesting sand bars. Under the current Forest Land and Resource Management Plan and its amendments, forest-wide, streamside management zone and riparian standards will protect the Flattened musk turtle and its habitat from any sediment that might be induced during management activities. Under planned management practices, vegetation treatments have been largely limited to upland areas outside of any streamside and riparian zones.

Overall direction of forest management activities provided in the Forest Health and Restoration Project will be beneficial for flattened musk turtles, as long as practices that have the potential to induce sediment into streams are conducted in such manner as to limit, reduce or minimize ground disturbance. The practices that could potentially effect this species would be those which disturb the soil, including thinning operations, temporary road construction and site preparation activities. If soil loss levels are maintained at or below the baseline soil tolerance there should be no effect on the flattened musk turtle. This will be the effect when these operations avoid steep slopes, utilize existing protective mechanisms such as those outlined in the Forest Land and Resource Management Plan, its amendments and revisions. While existing protective mechanisms are in place to protect this aquatic species it is important to prevent sediment from entering streams and water courses by utilizing soil conservation measures for any practice that allows erosion levels to rise above the acceptable levels. This can be done by retaining ground cover of vegetative debris on thinning operations in steep areas, reducing the use of drum chopping in steep areas and by utilizing soil conservation measures prior to closure of temporary roads. Outside the scope of this project, cumulative adverse effects including the inundation and habitat fragmentation associated with Lewis Smith reservoir.

On the Bankhead National Forest cut and leave or remove pest control measures have typically not extended to the streambanks in order to protect visual and natural resource qualities of the wild and scenic corridor along the prime turtle habitat of the Sipsey Fork. Cumulatively, several on-Forest (but not necessarily Forest Service controlled) reservoirs may continue to affect populations through altered flow, chemistry, and nutrient cycling, and as barriers to movements among tributaries**.** Habitat protection and monitoring will be the primary conservation objectives. Representative populations and/or habitat will be monitored by either search or other approved indices depending upon local conditions and species abundance. Actions will be taken in order to identify additional suitable habitat and re-establish turtles and their mussel prey to unoccupied areas on National Forest lands to ensure population viability.

Even though the same protective mechanisms will be in place for Alternative 2 as the others, the overall larger volume of the acreage treated by Alternative 2 would have a potential for greater impact. Implementation of protective standards will be monitored and adjusted as needed. Where needed to protect this species from potential adverse effects of management activities, project-level surveys would be conducted in accordance with procedures outlined in the Southeast Region supplement of the Forest Service Manual (FSM 2672). However, there may still continue to be some cumulative adverse effects including the inundation and habitat fragmentation associated with reservoirs although this is outside the scope of this project.

II. B.3.c. Determination of Effect – Flattened musk turtle

When recovery opportunities arise, they will be coordinated with the U.S. Fish and Wildlife Service and the appropriate state agency. Given these positive opportunities for pro-active conservation of the species and the protection afforded by the Forest-wide and riparian standards, it is likely that negative effects will be mitigated and minimized to a discountable and insignificant level and overall effects on the species will be beneficial. It is therefore my determination that the Alternatives 3 – 6 of the Forest Health and Restoration Project **may affect but is not likely to adversely affect the flattened musk turtle.**

II. B.4. Cumberlandian combshell (*Epioblasma brevidens)* Turgid blossom mussel (*Epioblasma turgidula*) Pink mucket pearlymussel (*Lampsillis orbiculata*) Rough pigtoe (*Pleurobema plenum*)

II. B.4. a. Environmental Baseline Cumberlandian combshell Turgid blossom mussel Pink mucket pearlymussel Rough pigtoe

These mussel species historically occurred throughout the mainstem of the Tennessee River basin in Alabama, Georgia, and Tennessee. Extant populations and historical or potential habitat on or near the National Forests in Alabama are displayed in Table BA.G.

Table BA.G - Four Mussel Species

Overview of Cumberlandian combshell, turgid blossom mussel, pink mucket pearlymussel, and rough pigtoe occurrences and potential habitat within five miles of the National Forests in Alabama.

River Basin	Watersheds	Miles		Forest	Counties	Status	Viability Risk[1]		
		on	near				L	M	H
Tennesse e	Upper Bear		0	Bankhead	Lawrence	historical			N
Tennesse e	Flint		0	Bankhead	Lawrence	historical			N
						historical			

[1]Viability risks: L = low, M = moderate, H = high, N = minimal FS influence, F = some FS influence

These species were historically found on stable gravel-cobble substrate in shoals in large rivers with medium to fast current velocities. They are either considered as extirpated or have never been found within the vicinity of Bankhead National Forest and thus are excluded from further consideration and evaluation. Although historical and critical habitat will be recognized, the procedures currently utilized for protection of water quality from silvicultural practices will provide protection of this habitat. Practices that have a potential to produce excessive levels of sediment should be restricted.

These species are excluded from additional analysis because the have extirpated or were never known to exist in the Bankhead National Forest.

II. B.5. Upland combshell (*Epioblasma metastriata*) Conrad

II. B.5. a. Environmental Baseline – Upland combshell

The upland combshell was federally listed as endangered in 1993 (USFWS 1993). The species historically occurred in the Black Warrior, Cahaba, and Coosa Rivers, and some of their tributaries in Alabama, Georgia, and Tennessee. Recent surveys of historic habitat have been unable to locate any extant populations. The species may be extinct, however, biologists continue to retain hope that additional surveys may locate these mussels (USFWS 2003). Critical habitat has been proposed for 8 watersheds in Alabama, Georgia, and Tennessee (USFWS 2003). It is not known to exist within the streams of Bankhead National Forest. Historical, potential, and proposed critical habitats on or near Bankhead National Forest are displayed in Table BA.H.

Table BA.H - Upland combshell

Overview of upland combshell historical, potential, and proposed critical habitat within five miles of the National Forests in Alabama.

River Basin	Watersheds	Miles		Forest	Counties	Status	Viability Risk[1]		
		on	near				L	M	H
B. Warrior	U. Sipsey Fork	0	0	Bankhead	Winston	extirpated			
total		0	0						

[1]Viability risks: L = low, M = moderate, H = high, N = minimal FS influence, F = some FS influence

Upland combshells were historically found on stable gravel-cobble substrate in shoals in medium rivers and large tributary streams with medium to fast current velocities. They are either considered as extirpated within the vicinity of Bankhead National Forest and thus are excluded from further consideration and evaluation. Although historical and critical habitat will be recognized, the procedures currently utilized for protection of water quality from silvicultural practices will provide protection of this habitat. Practices that have a potential to produce excessive levels of sediment should be restricted.

This species is thus excluded from further analysis because the have extirpated or were never known to exist in the Bankhead National Forest.

II. B.6. Fine-lined pocketbook (*Lampsilis altilis)* Conrad

II. B.6.a. Environmental Baseline – Fine-lined pocketbook

The fine-lined pocketbook was federally listed as threatened in 1993. The species historically occurred in the Alabama, Tombigbee, Black Warrior, Cahaba, Tallapoosa, Coosa River systems, and their tributaries. Currently, this species is limited to small streams above the fall line within the Cahaba, Coosa, and Tallapoosa River Basins (USFWS 2003). It is not currently known to exist within Bankhead National Forest although it historically had habitat in this area. This species is included in this analysis due to its having historical habitat within Bankhead National Forest and its being proposed for critical habitat designation. Critical habitat has been proposed for 12 watersheds including portions of the extant populations and historical habitats on or near Alabama National Forests these are displayed in Table BA.I.

Table BA.I - Fine-lined pocketbook

Overview of fine-lined pocketbook mussel historical, potential, and proposed critical habitat within five miles of the Bankhead National Forest.

<table>
<tr><th rowspan="2">River Basin</th><th rowspan="2">Watersheds</th><th colspan="2">Miles</th><th rowspan="2">Forest</th><th rowspan="2">Countie s</th><th rowspan="2">Status</th><th colspan="3">Viability Risk[2]</th></tr>
<tr><th>on</th><th>near</th><th>L</th><th>M</th><th>H</th></tr>
<tr><td rowspan="4">Black Warrior</td><td>Lower Brushy</td><td>13</td><td></td><td rowspan="4">Bankhead</td><td>Winston</td><td>historical</td><td></td><td>N</td><td></td></tr>
<tr><td>L. Sipsey Fork</td><td>24</td><td></td><td>Winston</td><td>historical</td><td></td><td></td><td>N</td></tr>
<tr><td>Upper Brushy</td><td>40</td><td></td><td>Winston</td><td>historical</td><td></td><td>F</td><td></td></tr>
<tr><td>U. Sipsey Fork</td><td>27</td><td></td><td>Winston</td><td>historical</td><td></td><td>F</td><td></td></tr>
<tr><td>Total</td><td></td><td>96</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="10">[1]Viability risks: L = low, M = moderate, H = high, N = minimal FS influence, F = some FS influence</td></tr>
</table>

This species is found in moderate to swift currents over stable sand, gravel, and cobble substrates in large rivers to small creeks.

The decline and extirpation of most populations of fine-lined pocketbook mussels may be attributed to habitat modification, sedimentation, eutrophication, and other forms of water quality degradation. Passage of host fish may also be a factor. The known or suspected extant populations of fine-lined pocketbook mussels probably inhabit less than half of the suitable habitat for this species within the Alabama National Forests. They are not known to exist on the Bankhead National Forest and thus are excluded from further consideration and evaluation. Although historical and critical habitat will be recognized, the procedures currently utilized for protection of water quality from silvicultural practices will provide protection of this habitat. Practices that have a potential to produce excessive levels of sediment should be restricted.

II. B.6.b. Direct, Indirect, and Cumulative Effects – Fine-lined Pocketbook

For populations of fine-lined pocketbook mussels and their proposed critical habitat on or near National Forests, potential management influences include any activity that could accelerate erosion or deposition, increase sedimentation or turbidity, alter water flow or chemistry, favor the spread of invasive species, or block host fish passage.

Siltation and turbidity may affect fine-lined pocketbook by altering the rocky interstitial spaces where they live and also by reducing foraging and reproductive effectiveness. While there is a background level of natural silt movement within the streams, if an action causes soil erosion it produces unnatural amounts that may cause resource damage. Under the proposed Forest Health and Restoration Project, the Forest-wide, streamside management zone and additional riparian standards will improve conditions within the historical habitat for the fine-lined pocketbook and minimize or alleviate impacts to proposed critical habitat by preventing sediment released during management activities. Forest Service activities are not likely to be of the magnitude or intensity to affect water flow.

Current operations of the Lewis Smith dam and possible impacts to aquatic species are being addressed with Alabama Power Company through the Federal Energy Regulatory Commission (FERC) relicensing process. However, these operations are not under Forest Service permit.

Cumulative watershed effects from off-forest sources are of concern given the interspersion of private in-holdings on some sections of proposed critical habitat as the Forest Service has no authority on private land activities. Continued habitat and watershed protection, monitoring, and restoration will be the primary recovery objectives on Forest lands. Habitat and representative populations will be monitored in conjunction with comprehensive surveys and project monitoring. Monitoring will include either search indices or transects depending on local conditions and mussel densities.

The general direction and exercise of the practices, which are part of this proposal for Forest Health and Restoration, will ultimately lead to a healthy forest cover for the Bankhead National Forest. This situation will provide beneficial conditions for the watershed of this aquatic species. If the practices contained herein are implemented by utilizing standards of Forest Service procedures; the direct, indirect and cumulative effects of thinning, site preparation and implementation of practices to reach the desired future conditions, will be minimized. In this case, it is likely that any negative effects will be mitigated or minimized to a discountable and insignificant level. This will be beneficial for historical habitat of the fine-lined pocketbook and their proposed critical habitat as compared to the baseline conditions. Furthermore, the provisions contained within the proposed draft Forest Plan provides opportunities for proactive habitat restoration and species protection through consolidation of Forest ownership, contributions to recovery and conservation, participation in population and habitat enhancements and restoration, and commitment to ongoing surveys and monitoring.

II. B.6.c. Determination of Effect – Fine-lined Pocketbook

The determination is "not likely to adversely affect" for fine-lined pocketbook mussel. The rationale for this decision rests upon the fact if the project were conducted without regard to the habitat needs of this Federally listed species, there is potential for harm to the species by means of soil erosion from the project. Project resource protections as described will be utilized to protect water quality within streams and tributaries, thus protecting the habitat for this species.

Thus, given the protection afforded by the Forest-wide and riparian standards, historical habitat of the fine-lined pocketbook and their proposed critical habitat should benefit from a healthy forest cover across National Forest lands. It is therefore my determination that the practices and management actions necessary to carry out the Forest Health and Restoration Project are **not likely to adversely affect the fine-lined pocketbook mussel and may not adversely modify proposed critical habitat.**

III. B.7. Orange-nacre mucket (*Lampsilis perovalis)*

II. B. 7.a. Environmental Baseline – Orange-nacre mucket

The orange-nacre mucket was federally listed as threatened in 1993 (USFWS 1993). The species historically occurred in the mainstem and tributaries of the Alabama, Tombigbee, Black Warrior, and Cahaba, River systems in Alabama, Mississippi, and Georgia. Currently, the mussel may be extirpated from the mainstem Tombigbee, Black Warrior, and Alabama Rivers; however it may still be found within several river basins including the Black Warrior and Cahaba Rivers (USFWS 2003). Critical habitat has been proposed for 15 watersheds in Alabama and Mississippi (USFWS 2003). Portions of the proposed critical habitat are located in the Sipsey Fork largely on the Bankhead National Forest.

Populations and potential habitats on or near National Forests are displayed in Table BA.J.

Table BA.J - Orange-nacre mucket

Overview of the orange-nacre mucket historical, potential, and proposed critical habitat within five miles of the National Forests in Alabama.

River Basin	Watersheds	Miles		Forest	Counties	Status	Viability Risk[1]		
		on	near				L	M	H
Black Warrior	Clear	11		Bankhead	Winston	unlikely			N
	Lower Brushy	13				unknown		N	
	L. Sipsey Fork	24	>5			24 mi occupied C.Hab			N
	U. Sipsey Fork	27				27 mi occupied C.Hab		F	
Total		75							

[1]Viability risks: L = low, M = moderate, H = high, N = minimal FS influence, F = some FS influence

This species inhabits streams and small rivers among stable sand, gravel, or cobble substrates in moderate to swift currents. Larval glochidia are released as superconglutinates (Haag et al. 1995) within the months of March through June (Hartfield and Butler 1997). Redeye bass, spotted bass, and largemouth bass have been identified as suitable fish hosts for the glochidia (Haag and Warren 1997). Freshwater mussels are filter feeders taking organic detritus, diatoms, phytoplankton, and zooplankton from the water column. As with many other freshwater mussels, orange-nacre muckets require clean gravel riffles and are especially susceptible to the threat of stream degradation resulting from low dissolved oxygen levels or high chlorine concentrations in waterways. Additionally, this species does not survive in impoundments and reservoirs. Other factors that can negatively impact freshwater mussels include contamination of waterways with pesticides, heavy metals, and other substances and the introduction of nonindigenous mollusks, such as the Asian clam and zebra mussel. The primary constituent elements of proposed critical habitat include: stable channels, appropriate flows, necessary water quality, clean substrates, available fish hosts, and lack of competitive nonnative species (USFWS 2003).

The decline and extirpation of most populations of orange-nacre mucket mussels may be attributed to habitat modification, sedimentation, eutrophication, and other forms of water quality degradation. Passage of host fish may also be a factor. The 7 known or suspected extant populations of orange-nacre muckets probably inhabit only a portion of the suitable habitat for this species within the Alabama National Forests. Recent drought conditions and existing barriers to fish passage may limit the extent of populations within the upper portions of most watersheds. Currently, only two known or suspected populations associated with the Alabama National Forests are considered moderately secure based upon analysis of potential watershed conditions that could place the species at risk. The remaining 5 watershed scale populations rank as high risk but have limited opportunities for Forest Service involvement. One population (Upper Sipsey Fork) is potentially at risk of population decline due to reduced base flows and a downstream reservoir possibly reducing the ability of the species to re-colonize the upper watershed.

II. B.7.b. Direct, Indirect, and Cumulative Effects – Orange-nacre mucket

Orange-nacre muckets are fairly widely distributed across the Upper Sipsey and Upper Brushy drainage, including Thompson, Flannagin, and Borden creeks in Lawrence county and Caney, North Fork Caney, Brushy, Capsey, Rush, Brown and Beech Creeks in Winston county. They are also a species that can inhabit long reaches extending from the mainstem to tributary headwaters. Consequently, the potential effects of Forest Service management activities are much broader than for other mussel species that do not inhabit such a wide range of habitat. For populations of orange-nacre mucket mussels and their proposed critical habitat on or near National Forests, potential management influences include any activity that could accelerate erosion or deposition, increase sedimentation or turbidity, alter water flow or chemistry, favor the spread of invasive species, or block host fish passage.

Siltation and turbidity may affect orange-nacre muckets by altering the rocky insterstitial spaces where they live and also by reducing foraging and reproductive effectiveness. The practices that could potentially effect this species would be those which disturb the soil, including thinning operations, temporary road construction and site preparation activities. Habitat will be protected by forest level actions to protect water quality. These actions include the use of erosion control measures on sloping areas of temporary roads, limited use of practices on areas with potential for excessive soil erosion, recognition of equipment restrictions within existing streamside management zones and adherence to guidelines for streamside management zones. Streamside management zone guidelines will be followed on every tract. Currently, there are no known stream crossings to be constructed within the habitat for this species. Thus, direct physical damage would be prevented to this species. Forest Service activities are not likely to be of the magnitude or intensity to affect water flow.

Erosion control efforts will be utilized by District personnel to prevent, reduce or control erosion. Indirect effects such as water quality degradation should be considered. This is addressed by employing mitigating measures. All proposed treatment sites for thinning or restoration, have streamside management zones and guidelines in place, thus no indirect effects are anticipated downstream.

Cumulative watershed effects are of particular concern given the interspersion of private in-holdings on some sections of proposed critical habitat. Continued habitat and watershed protection, monitoring, and restoration will be the primary recovery objectives. Habitat and representative populations will be monitored in conjunction with comprehensive surveys and project monitoring. Monitoring will include either search indices or transects depending on local conditions and mussel densities. Inventories of additional potential habitat areas will also be conducted.

The exercise of the practices, which are part of this proposal, will ultimately lead to a healthy forest cover for the Bankhead National Forest. This situation will provide beneficial conditions for the habitat of this aquatic species. If the practices contained herein are implemented by utilizing standards of Forest Service procedures; the direct, indirect and cumulative effects of thinning, site preparation and implementation of practices to reach the desired future conditions, will be minimized. In this case, it is likely that any negative effects will be mitigated, or minimized to a discountable and insignificant level.

II. B.7.c. Determination of Effect – Orange-nacre mucket

The determination is "not likely to adversely affect" for orange-nacre mucket mussel. The rationale for this decision rests upon the fact if the project were conducted without regard to the habitat needs of this federally listed species, there is potential for harm to the species by means of soil erosion from the project. Project resource protections as described will protect water quality within streams and tributaries, thus protecting the habitat for this species.

Thus, given the protection afforded by the Forest-wide and riparian standards, orange-nacre muckets and their proposed critical habitat should not be adversely impacted. However, there is potential for cumulative indirect and localized direct negative effects if steep slopes are treated with site preparation activities such as drum chopping. These areas will be site prepared by methods to prevent excessive soil loss or other measures will be taken to minimize soil erosion. It is therefore my determination that the practices which are the management actions necessary to carry out the Forest Health and Restoration Project are **not likely to adversely affect the orange-nacre mucket and may not adversely modify proposed critical habitat.**

II. B.8. Alabama moccasinshell (*Medionidus acutissimus)* Lea

II. B.8.a. Environmental Baseline – Alabama moccasinshell

The Alabama moccasinshell was federally listed as threatened in 1993 (USFWS 1993). The species historically occurred in the Alabama, Tombigbee, Black Warrior, Cahaba, Coosa River systems, and their tributaries in Alabama, Mississippi, and Georgia. The species appears to have declined or disappeared from the mainstem rivers of all basins but continues to survive in many tributary streams (USFWS 2003). Highest densities have been observed within the Sipsey Fork tributaries on the Bankhead National Forest (Warren and Haag 1994). Critical habitat has been proposed for 16 watersheds including portions within the Sipsey Fork largely on the Bankhead National Forest (USFWS 2003). Current and historical habitats on or near Bankhead National Forest are displayed in Table BA.K.

Table BA.K - Alabama moccasinshell

Overview of Alabama moccasinshell mussel occurrences and historical, potential, and proposed critical habitat within five miles of the National Forests in Alabama.

River Basin	Watersheds	Miles		Forest	Counties	Status	Viability Risk[1]		
		on	near				L	M	H
Black Warrior	Lower Brushy	13		Bankhead	Winston	present		N	
	Upper Brushy	40			Winston	present		F	
	L. Sipsey Fork	24			Winston	91mi occupied C.Hab			N
	U. Sipsey Fork	27			Winston	91mi occupied C.Hab		F	
total		10 4							

[1]Viability risks: L = low, M = moderate, H = high, N = minimal FS influence, F = some FS influence

This species is found in streams and small rivers along moderate to fast flowing shoals. It inhabits the interstices of gravel and cobble substrates, remaining completely embedded in the stream bottom most of the year. The blackspotted topminnow (*Fundulus olivaceus*), Tuskaloosa darter (*Etheostoma douglasi*), redfin darter (*E. whipplei*), blackbanded darter (*Percina nigrofaciata*), naked sand darter (*Ammocrypta beani*), southern sand darter (*A. Meridiana*), Johnny darter (*E. nigrum*), speckled darter (*E. stigmaeum*), saddleback darter (*Percina vigil*), and logperch (*P. caprodes*) have been identified as suitable fish hosts for the glochidia (Haag and Warren, 1997, 2001). Freshwater mussels are filter feeders taking organic detritus, diatoms, phytoplankton, and zooplankton from the water column. As with many other freshwater mussels, Alabama moccasinshells require clean gravel riffles and are especially susceptible to the threat of stream degradation resulting from low dissolved oxygen levels or high chlorine concentrations in waterways. Additionally, this species does not survive in impoundments and reservoirs. Other factors that can negatively impact freshwater mussels include contamination of waterways with pesticides, heavy metals, and other substances and the introduction of non-indigenous mollusks, such as the Asian clam and zebra mussel. The primary constituent elements of proposed critical habitat include: stable channels, appropriate flows, necessary water quality, clean substrates, available fish hosts, and lack of competitive nonnative species (USFWS 2003).

The decline and extirpation of most populations of Alabama moccasinshell may be attributed to habitat modification, sedimentation, eutrophication, and other forms of water quality degradation. Passage of host fish may also be a factor. The 8 known or suspected extant populations of Alabama moccasinshell probably inhabit less than half of the suitable habitat for this species within the Alabama National Forests. Recent drought conditions and existing barriers to fish passage may limit populations within the upper portions of these 8 watersheds. One population (Lower Sipsey Fork) is potentially at high risk of population decline due to reduced base flows and a downstream reservoir possibly limiting the ability of the species to re-colonize the upper watershed.

II. B.8.b. Direct, Indirect, and Cumulative Effects – Alabama moccasinshell

Alabama moccasinshells are fairly widely distributed across the Sipsey and Brushy drainages within Bankhead National Forest. They are also a species that can inhabit long reaches extending from the mainstem to tributary headwaters. For populations of Alabama moccasinshell mussels and their proposed critical habitat, potential management influences include any activity that could accelerate erosion or deposition, increase sedimentation or turbidity, alter water flow, or block host fish passage.

Excessive siltation and turbidity, which are caused by soil erosion, may affect Alabama moccasinshells by altering the rocky interstitial spaces where they live and also by reducing foraging and reproductive effectiveness. The streams where this species currently lives have a naturally occurring level of siltation and turbidity following significant precipitation events. The practices that could potentially effect this species would be those which disturb the soil and potentially result in excessive levels of soil loss. These practices include thinning operations, temporary road construction and site preparation activities.

Aquatic habitat will be protected by forest level actions to protect water quality. These actions include the use of erosion control measures on sloping areas of temporary roads, limited use of practices on areas that have potential for excessive soil erosion, recognition of equipment restrictions within existing streamside management zones and adherence to guidelines for streamside management zones. Streamside management zone guidelines which are required by the Forest Land and Resource Management Plan and its amendments and revisions will be followed on every tract. There are no known stream crossings to be constructed that are habitat to this species. Thus, direct physical damage would be prevented to this species and its habitat.

Indirect effects such as water quality degradation must be considered. There is potential for cumulative indirect and localized direct negative effects if steep slopes are treated with site preparation activities such as drum chopping. However, these areas will be site prepared by methods to prevent excessive soil loss or other measures will be taken to minimize soil erosion. Erosion control efforts will be utilized by District personnel to prevent, reduce or control erosion on temporary roads and constructed fire lines. This is addressed by employing mitigating measures. All proposed treatment sites for thinning or restorations have streamside management zones and guidelines in place, thus no indirect effects are anticipated downstream. Management activities will be limited on steep sites where excessive erosion could occur.

Forest Service activities are not likely to be of the magnitude or intensity to affect water flow. Current operations of the Lewis Smith dam and possible impacts to aquatic species are being addressed with Alabama Power Company through the Federal Energy Regulatory Commission relicensing process. However, these operations are not under Forest Service permit.

Cumulative watershed effects from off-forest sources are of concern given the interspersion of private in-holdings on some sections of proposed critical habitat. The Forest Service has no authority on private land activities. Continued habitat and watershed protection, monitoring, and restoration will be the primary recovery objectives on Forest lands. Habitat and representative populations will be monitored in conjunction with comprehensive surveys and project monitoring. Monitoring will include either search indices or transects depending on local conditions and mussel densities.

The general direction and exercise of the practices, which are part of this proposal for Forest Health and Restoration will ultimately lead to a healthy forest cover for the Bankhead National Forest. This situation will provide beneficial conditions for the watershed of this aquatic species. If the practices contained herein are implemented by utilizing standards of Forest Service procedures; the direct, indirect and cumulative effects of thinning, site preparation and implementation of practices to reach the desired future conditions, will be minimized. In this case, it is likely that any negative effects will be mitigated or minimized to a discountable and insignificant level. This will be beneficial for Alabama moccasinshells and their proposed critical habitat as compared to the baseline conditions. Furthermore, the provisions contained within the proposed draft Forest Plan provides opportunities for proactive habitat restoration and species protection through consolidation of Forest ownership, contributions to recovery and conservation, participation in population and habitat enhancements and restoration, and commitment to ongoing surveys and monitoring.

II. B.8.c. Determination of Effect – Alabama moccasinshell

The determination is "not likely to adversely affect" for Alabama moccasinshell mussels. The rationale for this decision rests upon the fact that if the project were conducted without regard to the habitat needs of this Federally listed species, there is potential for harm to the species by means of soil erosion from the project. Project resource protections as described will be utilized to protect water quality within streams and tributaries, thus protecting the habitat for this species.

Thus, given the protection afforded by the Forest-wide and riparian standards, Alabama moccasinshells and their proposed critical habitat should benefit from a healthy forest cover across the National Forest lands. It is therefore my determination that the practices and management actions necessary to carry out the Forest Health and Restoration Project are **not likely to adversely affect the Alabama moccasinshells and may not adversely modify proposed critical habitat.**

II. B.9. Coosa moccasinshell (*Medionidus parvulus)* Lea

II. B.9.a. Environmental Baseline – Coosa moccasinshell

The Coosa moccasinshell was federally listed as endangered in 1993 (USFWS 1993). The species historically occurred in the Cahaba, Sipsey Fork of the Black Warrior, Coosa River systems, and their tributaries in Alabama, Georgia, and Tennessee. Currently, the species may be extirpated from the Cahaba and Black Warrior River basins. Since listing, the species has only been documented in the Conasauga River of the upper Coosa River Basin (USFWS 2003). Critical habitat has been proposed on 9 watersheds of Alabama, Georgia, and Tennessee. This critical habitat does not include any portions of the streams within Bankhead National Forest (USFWS 2003). This species is included within this analysis primarily due to its status as having historical habitat within the Black Warrior basin and that it is a high profile species proposed for critical habitat designation in other areas. Historical, potential, and proposed critical habitats on or near National Forests are displayed in Table BA.L

Table BA.L - Coosa moccasinshell

Overview of Coosa moccasinshell historical, potential, and proposed critical habitat within five miles of the National Forests in Alabama.

River Basin	Watersheds	Miles		Forest	Counties	Status	Viability Risk[1]		
		on	near				L	M	H
Black Warrior	L. Sipsey Fork	24		Bankhead	Winston	historical			N
	U. Sipsey Fork	27			Lawrence	historical		F	
Total		11 9							

[1]Viability risks: L = low, M = moderate, H = high, N = minimal FS influence, F = some FS influence

This species inhabits the interstices of gravel and cobble in flowing shoals of streams and small rivers. The Coosa moccasinshell is usually completely buried in the stream bottom (USFWS 2003). Gravid females are thought to migrate to the surface during spring for release of their larval glochidia. They are known to utilize darters as glochidial hosts and other species may also be used (USFWS 2003). Freshwater mussels are filter feeders taking organic detritus, diatoms, phytoplankton, and zooplankton from the water column. The Coosa moccasinshell requires clean gravel riffles and are especially susceptible to stream degradation resulting from low dissolved oxygen levels or high chlorine concentrations in waterways. Additionally, this species does not survive in impoundments and reservoirs. Other factors that can negatively impact freshwater mussels include contamination of waterways with pesticides, heavy metals and other substances and the introduction of non-indigenous mollusks, such as the Asian clam and zebra mussel. The primary constituent elements of proposed critical habitat include: stable channels, appropriate flows, necessary water quality, clean substrates, available fish hosts, and lack of competitive nonnative species (USFWS 2003).

The decline and extirpation of most populations of Coosa moccasinshells may be attributed to habitat modification, sedimentation, eutrophication, and other forms of water quality degradation. Passage of host fish may also be a factor. The 5 known or suspected extant populations of Coosa moccasinshell mussels probably inhabit only a small fraction of the suitable habitat remaining for this species within the Alabama National Forests and none is known from Bankhead National

Forest. Recent drought conditions and existing barriers to fish passage, such as the presence of numerous reservoirs, may limit populations within the upper portions of these watersheds. One population (Lower Sipsey Fork) is potentially at risk of population decline due to factors beyond the influence of the National Forests, such as reduced base flows, periodic inundation, and habitat fragmentation from a reservoir located downstream.

II. B.9.b. Direct, Indirect, and Cumulative Effects – Coosa moccasinshell

For populations of Coosa moccasinshell mussels and their proposed critical habitat on or near National Forests, potential management influences include any activity that could accelerate erosion or deposition, increase sedimentation or turbidity, alter water flow or chemistry, favor the spread of invasive species, or block host fish passage.

Siltation and turbidity may affect Coosa moccasinshells by altering the rocky insterstitial spaces where they live and also by reducing foraging and reproductive effectiveness. While there is a background level of natural silt movement within the streams, if an action causes soil erosion it produces un-naturally high amounts that may cause resource damage. Under the proposed Forest Health and Restoration Project, the Forest-wide streamside management zone and additional riparian standards will improve conditions within the historical habitat for the Coosa moccasinshell and minimize or alleviate impacts to proposed critical habitat by preventing sediment released during management activities.

Forest Service activities are not likely to be of the magnitude or intensity to affect water flow. Current operations of the Lewis Smith dam and possible impacts to aquatic species are being addressed with Alabama Power Company through the Federal Energy Regulatory Commission relicensing process. However, these operations are not under Forest Service permit.

Cumulative watershed effects from off-forest sources are of concern given the interspersion of private in-holdings on some sections of proposed critical habitat as the Forest Service has no authority on private land activities. Continued habitat and watershed protection, monitoring, and restoration will be the primary recovery objectives on Forest lands. Habitat and representative populations will be monitored in conjunction with comprehensive surveys and project monitoring. Monitoring will include either search indices or transects depending on local conditions and mussel densities.

The general direction and exercise of the practices, which are part of this proposal for Forest Health and Restoration, will ultimately lead to a healthy forest cover for the Bankhead National Forest. This situation will provide beneficial conditions for the watershed of this aquatic species. If the practices contained herein are implemented by utilizing standards of Forest Service procedures; the direct, indirect and cumulative effects of thinning, site preparation and implementation of practices to reach the desired future conditions, will be minimized. In this case, it is likely that any negative effects will be mitigated or minimized to a discountable and insignificant level. This will be beneficial for historical habitat of the Coosa moccasinshell and their proposed critical habitat as compared to the baseline conditions. Furthermore, the provisions contained within the proposed (although currently in DRAFT format) Forest Plan provides opportunities for proactive habitat restoration and species protection through consolidation of Forest ownership, contributions to recovery and conservation, participation in population and habitat enhancements and restoration, and commitment to ongoing surveys and monitoring.

II. B.9.c. Determination of Effect – Coosa moccasinshell

The determination is “not likely to adversely affect” for Coosa moccasinshell mussels. The rationale for this decision rests upon the fact if the project were conducted without regard to the habitat needs of this federally listed species, there is potential for harm to the species by means of soil erosion from the project. Project resource protections as described will be utilized to protect water quality within streams and tributaries, thus protecting the habitat for this species.

Thus, given the protection afforded by the Forest-wide and riparian standards, historical habitat of the Coosa moccasinshells and their proposed critical habitat should benefit from a healthy forest cover across the National Forest lands. It is therefore my determination that the practices and management actions necessary to carry out the Forest Health and Restoration Project are **not likely to adversely affect the Coosa moccasinshells and may not adversely modify proposed critical habitat.**

II. B.10. Dark pigtoe (Pleuorbema furvum)

II. B.10.a. Environmental Baseline – Dark pigtoe

The dark pigtoe was federally listed as endangered in 1993 (USFWS 1993). The species historically was restricted to the Black Warrior River basin above the fall line (USFWS 2003). Since listing, it has been confirmed in the Sipsey Fork and its tributaries including Caney creek and tributaries of upper Brushy such as Brown, Capsey and Rush creeks (USFWS 2003). Highest population densities have also been recorded in these areas (Warren and Haag 1994). Critical habitat has been proposed including areas within the Sipsey Fork, largely on the Bankhead National Forest (USFWS 2003).

Table BA.M - Dark pigtoe

Overview of known or suspected dark pigtoe mussel historical, potential, and proposed critical habitat within five miles of the National Forests in Alabama.

River Basin	Watersheds	Miles		Forest	Counties	Population status	Viability Risk[1]		
		on	near				L	M	H
Black Warrior	Clear	11		Bankhead	Winston	unlikely			N
	Lower Brushy	13			Winston	present		N	
	L. Sipsey Fork	24			Winston	91mi occupied C.Hab			N
	Upper Brushy	40			Winston	present		F	
	U. Sipsey Fork	27			Winston	present		F	
Total		115							

[1]Viability risks: L = low, M = moderate, H = high, N = minimal FS influence, F = some FS influence

This species is found in sand, gravel, and cobble shoals and runs in small rivers and large streams. This species is gravid in June and releases glochidia in peach to pink colored conglutinates (Haag and Warren 1997). Fish hosts have been identified as the largescale stoneroller (*Campostoma oligolepis*), Alabama shiner, blacktail shiner, creek chub (*Semotilus* *atromaculatus*), and blackspotted topminnow (Haag and Warren 1997). Freshwater mussels are filter feeders taking organic detritus, diatoms, phytoplankton, and zooplankton from the water column.

The decline and extirpation of most populations of dark pigtoe mussels may be attributed to habitat modification, sedimentation, eutrophication, and other forms of water quality degradation. Mussels such as the dark pigtoe require clean gravel riffles and are especially susceptible to stream degradation resulting from low dissolved oxygen levels or high chlorine concentrations in waterways. This species does not survive in impoundments and reservoirs. Other factors that can negatively impact freshwater mussels include contamination of waterways with pesticides, heavy metals, and other substances and the introduction of non-indigenous mollusks, such as the Asian clam and zebra mussel. The primary constituent elements of proposed critical habitat include: stable channels, appropriate flows, necessary water quality, clean substrates, available fish hosts, and lack of competitive nonnative species (USFWS 2003).

II. B.10.b. Direct, Indirect, and Cumulative Effects -- Dark pigtoe

Dark pigtoes are limited to the Bankhead National Forest. For populations of dark pigtoe mussels and their proposed critical habitat on or near National Forests, potential management influences include any activity that could accelerate erosion or deposition, increase sedimentation or turbidity, alter water flow or chemistry, favor the spread of invasive species, or block host fish passage.

Excessive siltation and turbidity, which are caused by soil erosion may affect dark pigtoe mussels by altering the rocky interstitial spaces where they live and also by reducing foraging and reproductive effectiveness. The streams where this species currently lives have a naturally occurring level of siltation and turbidity following significant precipitation events. The practices that could potentially effect this species would be those which disturb the soil and potentially result in excessive levels of soil loss. These practices include thinning operations, temporary road construction and site preparation activities.

Aquatic habitat will be protected by forest level actions to protect water quality. These actions include the use of erosion control measures on sloping areas of temporary roads, limited use of practices on areas that have potential for excessive soil erosion, recognition of equipment restrictions within existing streamside management zones and adherence to guidelines for streamside management zones. Streamside management zone guidelines, which are required by the Forest Land and Resource Management Plan and its amendments and revisions will be followed on every tract. There are no known stream crossings to be constructed that are habitat to this species. Thus, direct physical damage would be prevented to this species and its habitat.

Indirect effects such as water quality degradation should be considered. There is potential for cumulative indirect and localized direct negative effects if steep slopes are treated with site preparation activities such as drum chopping. However, these areas will be site prepared by methods to prevent excessive soil loss or other measures will be taken to minimize soil erosion. Erosion control efforts will be utilized by District personnel to prevent, reduce or control erosion on temporary roads and constructed fire lines. This is addressed by employing mitigating measures. All proposed treatment sites for thinning or restorations have streamside management zones and guidelines in place, thus no indirect effects are anticipated downstream. Management activities will be limited on steep sites where excessive erosion could occur.

Current operations of the Lewis Smith Dam and possible impacts to aquatic species are being addressed with Alabama Power Company through the Federal Energy Regulatory Commission (FERC) relicensing process. However, these operations are not under Forest Service permit.

Cumulative watershed effects from off-forest sources are of concern given the interspersion of private in-holdings on some sections of proposed critical habitat as the Forest Service has no authority on private land activities. Continued habitat and watershed protection, monitoring, and restoration will be the primary recovery objectives on Forest lands. Habitat and representative populations will be monitored in conjunction with comprehensive surveys and project monitoring. Monitoring will include either search indices or transects depending on local conditions and mussel densities.

The general direction and exercise of the practices, which are part of this proposal for Forest Health and Restoration will ultimately lead to a healthy forest cover for the Bankhead National Forest. This situation will provide beneficial conditions for the watershed of this aquatic species. If the practices contained herein are implemented by utilizing standards of Forest Service procedures; the direct, indirect and cumulative effects of thinning, site preparation and implementation of practices to reach the desired future conditions, will be minimized. In this case, it is likely that any negative effects will be mitigated or minimized to a discountable and insignificant level. This will be beneficial for dark pigtoe mussels and their proposed critical habitat as compared to the baseline conditions. Furthermore, the provisions contained within the proposed (although currently in Draft format) Forest Plan provides opportunities for proactive habitat restoration and species protection through consolidation of Forest ownership, contributions to recovery and conservation, participation in population and habitat enhancements and restoration, and commitment to ongoing surveys and monitoring.

II. B.10.c. Determination of Effect – Dark Pigtoe

The determination is "not likely to adversely affect" for dark pigtoe mussels. The rationale for this decision rests upon the fact if the project were conducted without regard to the habitat needs of this federally listed species, there is potential for harm to the species by means of soil erosion from the project. Project resource protections as described will be utilized to protect water quality within streams and tributaries, thus protecting the habitat for this species.

Thus, given the protection afforded by the Forest-wide and riparian standards, dark pigtoe mussels and their proposed critical habitat should benefit from a healthy forest cover across the National Forest lands. It is therefore my determination that the practices and management actions necessary to carry out the Forest Health and Restoration Project are **not likely to adversely affect the dark pigtoe mussels and may not adversely modify proposed critical habitat.**

II. B.11. Ovate clubshell (*Pleurobema perovatum*) Lea

II. B.11.a. Environmental Baseline – Ovate clubshell

The ovate clubshell was federally listed as endangered in 1993 (USFWS 1993). The species historically occurred in the Tombigbee, Black Warrior, Alabama, Cahaba, Tallapoosa and Coosa Rivers, and their tributaries in Mississippi, Alabama, and Georgia. Apparently, the species is extirpated from the Black Warrior, Cahaba, and Alabama River basins and it may no longer survive in the mainstem Tombigbee River and Uphapee and Opintlocco Creeks (USFWS 2003). Critical habitat has been proposed for 20 watersheds in Alabama, Mississippi, Geogia, and Tennessee (USFWS 2003). Portions of proposed critical habitat are within Uphapee and Chewacla Creeks on the Tuskegee National Forest, Terrapin Creek on the Shoal Creek District of the Talladega National Forest, Hatchet Creek downstream of the Talladega District, Sipsey Fork largely on the Bankhead National Forest, and the Cahaba River upstream from the Oakmulgee Division of the Talladega National Forest. It is not currently known to exist within Bankhead National Forest although it historically had habitat in this area. Historical, potential, and proposed critical habitats on or near National Forests are displayed in Table BA.N.

Table BA.N - Ovate clubshell

Overview of known or suspected ovate clubshell mussel historical, potential and proposed critical habitat within five miles of the National Forests in Alabama.

River Basin	Watersheds	Miles		Forest	Counties	Status	Viability Risk[2]		
		on	near				L	M	H
Black Warrior	Lower Brushy	13		Bankhead	Winston	extirpated?			
	Upper Brushy	40				extirpated?		F	
	U. Sipsey Fork	27				unoccupied C.Hab		F	
Total		80							

[1]Viability risks: L = low, M = moderate, H = high, N = minimal FS influence, F = some FS influence

This species utilizes habitat consisting of sand and gravel shoals and runs in large streams and small rivers. Gravid females are observed from June through July and glochidia are released as well formed white conglutinates (USFWS 2003). Host fish are unknown for this species. Freshwater mussels are filter feeders taking organic detritus, diatoms, phytoplankton, and zooplankton from the water column. The ovate clubshell utilizes stable sediments and requires clean gravel riffles and are especially susceptible to stream degradation resulting from low dissolved oxygen levels or high chlorine concentrations in waterways. Additionally, this species does not survive in impoundments and reservoirs. Other factors that can negatively impact freshwater mussels include contamination of waterways with pesticides, heavy metals, and other substances and the introduction of non-indigenous mollusks, such as the Asian clam and zebra mussel (*Dreissena polymorpha*). The primary constituent elements of proposed critical habitat include: stable channels, appropriate flows, necessary water quality, clean substrates, available fish hosts, and lack of competitive nonnative species (USFWS 2003).

The decline and extirpation of most populations of ovate clubshells may be attributed to habitat modification, sedimentation, eutrophication, and other forms of water quality degradation. Passage of host fish may also be a factor. The known or suspected extant populations of ovate clubshell mussels probably inhabit only a small fraction of the suitable habitat remaining for this species within the National Forests in Alabama and none is known from Bankhead National Forest. Recent drought conditions and existing barriers to fish passage, such as the presence of numerous reservoirs, may limit populations within the upper portions of these watersheds. One population (Upper Sipsey Fork) is potentially at risk of population decline due to factors beyond the influence of the National Forests, such as reduced base flows, and a downstream reservoir making it difficult for the species to re-colonize the upper watershed.

II. B.11.b. Direct, Indirect, and Cumulative Effects – Ovate Clubshell

For populations of ovate clubshell mussels and their proposed critical habitat on or near National Forests, potential management influences include any activity that could accelerate erosion or deposition, increase sedimentation or turbidity, alter water flow or chemistry, favor the spread of invasive species, or block host fish passage.

Siltation and turbidity may affect ovate clubshell by altering the rocky insterstitial spaces where they live and also by reducing foraging and reproductive effectiveness. While there is a background level of natural silt movement within the streams, if an action causes soil erosion it produces un-naturally high amounts that may cause resource damage. Under the proposed Forest Health and Restoration Project, the Forest-wide, streamside management zone and additional riparian standards will improve conditions within the historical habitat for the ovate clubshell and minimize or alleviate impacts to proposed critical habitat by preventing sediment released during management activities. Forest Service activities are not likely to be of the magnitude or intensity to affect water flow.

Forest Service activities are not likely to be of the magnitude or intensity to affect water flow. Current operations of the Lewis Smith Dam and possible impacts to aquatic species are being addressed with Alabama Power Company through the Federal Energy Regulatory Commission relicensing process. However, these operations are not under Forest Service permit.

Cumulative watershed effects from off-forest sources are of concern given the interspersion of private in-holdings on some sections of proposed critical habitat as the Forest Service has no authority on private land activities. Continued habitat and watershed protection, monitoring, and restoration will be the primary recovery objectives on Forest lands. Habitat and representative populations will be monitored in conjunction with comprehensive surveys and project monitoring. Monitoring will include either search indices or transects depending on local conditions and mussel densities.

The general direction and exercise of the practices, which are part of this proposal for Forest Health and Restoration will ultimately lead to a healthy forest cover for the Bankhead National Forest. This situation will provide beneficial conditions for the watershed of this aquatic species. If the practices contained herein are implemented by utilizing standards of Forest Service procedures; the direct, indirect and cumulative effects of thinning, site preparation and implementation of practices to reach the desired future conditions, will be minimized. In this case, it is likely that any negative effects will be mitigated or minimized to a discountable and insignificant level. This will be beneficial for historical habitat of the ovate clubshell and their proposed critical habitat as compared to the baseline conditions. Furthermore, the provisions contained within the proposed (although currently in Draft format) Forest Plan provides opportunities for proactive habitat restoration and species protection through consolidation of Forest ownership, contributions to recovery and conservation, participation in population and habitat enhancements and restoration, and commitment to ongoing surveys and monitoring.

II. B.11.c. Determination of Effect – Ovate Clubshell

The determination is "not likely to adversely affect" for ovate clubshell mussel. The rationale for this decision rests upon the fact if the project were conducted without regard to the habitat needs of this Federally listed species, there is potential for harm to the species by means of soil erosion from the project. Project resource protections as described will be utilized to protect water quality within streams and tributaries, thus protecting the habitat for this species.

Thus, given the protection afforded by the Forest-wide and riparian standards, historical habitat of the ovate clubshells and their proposed critical habitat should benefit from a healthy forest cover across the National Forest lands. It is therefore my determination that the practices and management actions necessary to carry out the Forest Health and Restoration Project are **not likely to adversely affect the ovate clubshells and may not adversely modify proposed critical habitat.**

II. B.12. Triangular kidneyshell (*Ptychobranchus greeni)* Conrad

II. B.12.a. Environmental Baseline -- Triangular kidneyshell

The triangular kidneyshell was federally listed as endangered in 1993 (USFWS 1993). The species historically occurred in the Black Warrior, Cahaba, Alabama, and Coosa River systems, and their tributaries in Alabama, Georgia, and Tennessee. The species may be extirpated from the Alabama River and may no longer inhabit the mainstems of the Black Warrior and Coosa Rivers (USFWS 2003). Critical habitat has been proposed for 13 watersheds in Alabama, Georgia, and Tennessee (USFWS 2003). Portions of proposed critical habitat are within the Sipsey Fork largely on the Bankhead National Forest. Historical, potential, and proposed critical habitats on or near National Forests are displayed in Table BA.O.

Table BA.O - Triangular kidneyshell

Overview of known or suspected triangular kidneyshell mussel historical, potential, and proposed critical habitat within five miles of the National Forests in Alabama.

River Basin	Watersheds	Miles		Forest	Counties	Population Status	Viability Risk[1]		
		on	near				L	M	H
Black Warrior	L. Sipsey Fork	24		Bankhead	Winston	91mi occupied C.Hab			N
	U. Sipsey Fork	27			Lawrence	91mi occupied C.Hab		F	
	Upper Brushy	40			Winston	present		F	
Total		91							

[1]Viability risks: L = low, M = moderate, H = high, N = minimal FS influence, F = some FS influence

This species is found in areas with rapid currents over shoals and riffles in large streams and small rivers. Larval glochidia are released from March through April as conglutinates that mimic dipteran larvae (Hartfield and Hartfield 1996) or fish eggs (Haag and Warren 1997) and serve to attract potential host fish. The Warrior darter (Etheostoma bellator), Tuscaloosa darter, blackbanded darter, and logperch have been identified as suitable fish hosts for the glochidia (Haag and Warren 1997). Freshwater mussels are filter feeders taking organic detritus, diatoms, phytoplankton, and zooplankton from the water column. This species requires clean gravel riffles and are especially susceptible to stream degradation resulting from low dissolved oxygen levels or high chlorine concentrations in waterways. As with many other freshwater mussels, the triangular kidneyshell does not survive impoundments and reservoirs. Other factors that can negatively impact freshwater mussels include contamination of waterways with pesticides, heavy metals, and other substances and the introduction of nonindigenous mollusks, such as the Asian clam and zebra mussel. The primary constituent elements of proposed critical habitat include: stable channels, appropriate flows, necessary water quality, clean substrates, available fish hosts, and lack of competitive nonnative species (USFWS 2003).

The decline and extirpation of most populations of triangular kidneyshell may be attributed to habitat modification, sedimentation, eutrophication, and other forms of water quality degradation. Passage of host fish may also be a factor. The 7 known or suspected extant populations of triangular kidneyshell probably inhabit less than half of the suitable habitat for this species within the National Forests in Alabama. Recent drought conditions and existing barriers to fish passage may further limit populations within the upper portions of these watersheds. Currently, 2 of 7 known or suspected populations associated with the National Forests in Alabama are considered at high risk based upon analysis of potential watershed conditions

II. B.12.b. Direct, Indirect, and Cumulative Effects – Triangular kidneyshell

Triangular kidneyshells are fairly widely distributed across Sipsey Fork and Brushy Creek of the Bankhead National Forest. They are also a species that can inhabit long reaches extending from the mainstem to tributary headwaters. Consequently, the potential affects of Forest Service management activities are much broader than for species that have a smaller zone of habitat. For populations of triangular kidneyshell mussels and their proposed critical habitat on or near National Forests, potential management influences include any activity that could accelerate erosion or deposition, increase sedimentation or turbidity, alter water flow or chemistry, favor the spread of invasive species, or block host fish passage.

Excessive siltation and turbidity, which are caused by soil erosion may affect triangular kidneyshells by altering the rocky insterstitial spaces where they live and also by reducing foraging and reproductive effectiveness. The streams where this species currently lives have a naturally occurring level of siltation and turbidity following significant precipitation events. The practices that could potentially effect this species would be those which disturb the soil and potentially result in excessive levels of soil loss. These practices include thinning operations, temporary road construction and site preparation activities.

Aquatic habitat will be protected by forest level actions to protect water quality. These actions include the use of erosion control measures on sloping areas of temporary roads, limited use of practices on areas that have potential for excessive soil erosion, recognition of equipment restrictions within existing streamside management zones and adherence to guidelines for streamside management zones. Streamside management zone guidelines, which are required by the Forest Land and Resource Management Plan and its amendments and revisions, will be followed on every tract. There are no known stream crossings to be constructed that are habitat to this species. Thus, direct physical damage would be prevented to this species and its habitat.

Indirect effects such as water quality degradation should be considered. There is potential for cumulative indirect and localized direct negative effects if steep slopes are treated with site preparation activities such as drum chopping. However, these areas will be site prepared by methods to prevent excessive soil loss or other measures will be taken to minimize soil erosion. Erosion control efforts will be utilized by District personnel to prevent, reduce or control erosion on temporary roads and constructed fire lines. This is addressed by employing mitigating measures. All proposed treatment sites for thinning or restoration practices have streamside management zones and guidelines in place, thus no indirect effects are anticipated downstream. Management activities will be limited on steep sites where excessive erosion could occur.

Forest Service activities are not likely to be of the magnitude or intensity to affect water flow. Current operations of the Lewis Smith dam and possible impacts to aquatic species are being addressed with Alabama Power Company through the Federal Energy Regulatory Commission relicensing process. However, these operations are not under Forest Service permit.

Cumulative watershed effects from off-forest sources are of concern given the interspersion of private in-holdings on some sections of proposed critical habitat as the Forest Service has no authority on private land activities. Continued habitat and watershed protection, monitoring, and restoration will be the primary recovery objectives on Forest lands. Habitat and representative populations will be monitored in conjunction with comprehensive surveys and project monitoring. Monitoring will include either search indices or transects depending on local conditions and mussel densities.

The general direction and exercise of the practices, which are part of this proposal for Forest Health and Restoration, will ultimately lead to a healthy forest cover for the Bankhead National

Forest. This situation will provide beneficial conditions for the watershed of this aquatic species. If the practices contained herein are implemented by utilizing standards of Forest Service procedures; the direct, indirect and cumulative effects of thinning, site preparation and implementation of practices to reach the desired future conditions, will be minimized. In this case, it is likely that any negative effects will be mitigated or minimized to a discountable and insignificant level. This will be beneficial for triangular kidneyshells and their proposed critical habitat as compared to the baseline conditions. Furthermore, the provisions contained within the proposed (although currently in Draft format) Forest Plan provides opportunities for proactive habitat restoration and species protection through consolidation of Forest ownership, contributions to recovery and conservation, participation in population and habitat enhancements and restoration, and commitment to ongoing surveys and monitoring.

II. B.12.c. Determination of Effect – Triangular Kidneyshell

The determination is “not likely to adversely affect” for triangular kidneyshell mussels. The rationale for this decision rests upon the fact if the project were conducted without regard to the habitat needs of this Federally listed species, there is potential for harm to the species by means of soil erosion from the project. Project resource protections as described will be utilized to protect water quality within streams and tributaries, thus protecting the habitat for this species.

Thus, given the protection afforded by the Forest-wide and riparian standards, triangular kidneyshells and their proposed critical habitat should benefit from a healthy forest cover across the National Forest lands. It is therefore my determination that the practices and management actions necessary to carry out the Forest Health and Restoration Project are **not likely to adversely affect the triangular kidneyshells and may not adversely modify proposed critical habitat.**

Scientific Name	**Common Name**	**Determination of Effects**
Necturus alabamensis	Black Warrior waterdog (Candidate species)	Not likely to adversely affect
Sternotherus depressus	Flattened musk turtle	Not likely to adversely affect
Epioblasma brevidens	Cumberlandian combshell	Not likely to adversely affect
Epioblasma metastriata	Upland combshell	Not likely to adversely affect
Lampsilis altilis	Fine-lined pocketbook	Not likely to adversely affect
Lampsilis perovalis	Orange-nacre mucket	Not likely to adversely affect
Medionidus acutissimus	Alabama moccasinshell	Not likely to adversely affect
Medionidus parvulus	Coosa moccasinshell	Not likely to adversely affect
Pleurobema dicisum	Southern clubshell	Not likely to adversely affect

Scientific Name	Common Name	Determination of Effects
Pleurobema furvum	Dark pigtoe	Not likely to adversely affect
Pleurobema perovatum	Ovate clubshell	Not likely to adversely affect
Ptychobranchus greeni	Triangular kidneyshell	Not likely to adversely affect

Table BA.P - Determination of Effects for Federally Listed Aquatic Animals

II. C. FEDERALLY LISTED PLANTS

- Leafy prairie clover *(Dalea foliosa)* – E
- Eggert's sunflower *(Helianthus eggertii)* – T
- Fleshy-fruit gladecress *(Leavenworthia crassa)* – C
- Lyrate bladder-pod *(Lesquerella lyrata)* - T
- Mohr's Barbara's buttons *(Marshallia mohrii)* – T
- White fringeless orchid *(Platanthera integrilabia)* - C
- Kral's water-plantain *(Sagittaria secundifolia)* - T
- Alabama streak-sorus fern *(Thelypteris pilosa var alabamense)* – T
- Tennessee yellow-eyed grass *(Xyris tennesseensis)* – E

T&E Plants Introduction

The Bankhead National Forest has seven T&E and two candidate species of plants on or near National Forest lands. This places the National Forest lands as an important refugium for many habitats and federally listed species.

All of the species listed above are rare throughout their range. The federal listing and candidate status of these species is primarily a result of their apparent limited distribution and the fragile nature of the habitats upon which they depend. Even though suitable habitat has been found to occur on National Forests in Alabama lands, it is rarely occupied by these T&E or Candidate species. Habitat loss through land conversion and development remain the principle reasons cited by all sources as contributing to a trend toward listing or keeping these species federally listed. Additional impacts include modification of habitat, loss of fire in the ecosystem, changes in hydrological function, changes in landform, building of dams, invasion of non-native plant species and over-collection or poaching from wild populations.

Many of these federally listed and candidate species occur within rare communities. Several standards for rare communities will ensure their maintenance and restoration across the landscape. Rare communities would be protected from detrimental effects caused by management actions across all alternatives. Rare communities have been inventoried in proposed project areas when projects are being proposed which have the potential to adversely affect them. Because of these standards, most federally listed species will have additional protection and restoration mandates.

Based on several of the plants' dependence on wetland habitat these species could be positively managed by protecting sites from encroachment by woody shrub species, leaving a partial or thinned overstory canopy in place and ensuring that activities taking place in areas where the plant occurs do not adversely affect the hydrology of the site (Moffett 2002). Management options would include thinning based on site-specific recommendations and burning. Total canopy removal is not recommended for most species (Moffett 2002).

Disturbance in the form of mechanical soil disturbance, compaction, rutting and activities that could alter the hydrology or landform of the populations sites, habitat or potential suitable sites are activities that could result in impact to these plants. Plants may be impacted by drought, and competition with successional vegetation or invasive non-native species.

Management issues specific to many of the above-listed species include:

- Thinning and maintenance of frequent disturbance as necessary to encourage dominance of grasses and other herbaceous species in the understory of adjacent stands;
- Encouraging spread of populations that occur on rights-of-way into adjacent stands.

T&E Plants Summary of Effects

The combination of site specific surveys, forest-wide standards and site specific mitigations as described previously afford very good protection to the federally listed species populations and habitats from potential negative effects due to proposed forest management activities. Despite this, some species may have some inherent biological limitations that could continue to pose risks to long-term viability, especially at sites where population numbers are low. Based upon this, it is apparent that while Forest Service conservation actions may contribute to improve rangewide viability, they cannot in all cases, maintain it.

Under the Forest Health and Restoration Project the integrity of these sites will be protected in all alternatives by adherence to the standards listed in the Forest Land and Resource Management Plan its amendments and subsequent revisions. In some cases, such as restoration efforts or reintroduction of species, the Bankhead National Forest can play a positive role in recovery that will result in positive impacts. Because these federally listed and candidate species are protected under the Endangered Species Act, no activities with potential to affect areas where the plants are found can take place in the sites without concurrence from, or consultation with the Fish and Wildlife Service.

Therefore, under all alternatives, the current Endangered Species Act and the current Forest Service Manual and Handbook regulations will continue to ensure that habitat and populations of T&E and candidate species will be protected and conserved. Additionally, pre-project surveys were conducted `and post-project monitoring will be conducted in all areas within close proximity to known or potential habitat for the species to ensure that secondary effects do not alter the integrity of sites. Therefore, a no net loss policy will continue to remain in effect for the life of this current forest plan.

As previously stated, the Bankhead National Forest will continue to play a critical role as refugia for federally threatened and endangered species. Inherent biological limitations based upon population dynamics may continue to pose risks to the species long-term viability, especially at small sites. Potential impacts to individuals remain at all sites through plant poaching. As conversion and habitat modifications continue on private lands, it is to be expected that more species and critical habitat will be lost. As a result, the role for protection and restoration of these federally listed species on the Bankhead National Forest will continue to become more critical over time. Surveys will continue to be conducted to inventory for federally listed and candidate species and suitable habitat, and monitoring of known sites will continue.

Because rare plants often receive little or no protection on private land, and are often not well inventoried, public land plays a critical role in their conservation. Cumulatively, therefore, persistence of these species in the area of the National Forest, as well as across their ranges, will be greatly enhanced from efforts on the National Forest to maintain, manage and expand populations.

Project level inventories were conducted to gather information on the presence or absence of protected species (federally listed, Forest Service sensitive and locally rare) within the area affected by the project. All loblolly pine stands with project activities planned were evaluated.

Biological surveys have been completed for 100% of loblolly pine stands between the ages of 21 and 45 years, which are planned to be treated by an activity that causes ground disturbance. This includes thinning of pine stands and the site preparation activities, such as drum chopping and site preparation burning, which will be required for restoration treatments.

In addition, survey methodology called for sampling of sites comprised of loblolly pine plantations which are between 15 and 20 years of age. These loblolly stands are at the age where a majority of the shrub and herbaceous understory is absent. This is due to the thick and bushy growth of pine trees at this age, which prevents sunlight from reaching the forest floor, effectively reducing the development of an understory. Based upon experience and field reviews conducted on Bankhead National Forest, these stands were determined by the Forest Botanist and the Bankhead District Wildlife Biologist as the stands with the lowest likelihood for occurrence for protected species. Field surveys were performed on 48% of the acreage of these sites. Consistent with the biologist's recommendation, no federally listed or Forest Service sensitive species were found during surveys. However, a small percentage of the sites were found to have some of the locally rare species within or adjacent to the stand (Blue Ridge trillium, silky camellia, small head gayflower, pinesap, little leaf alum root and Nestronia). Due to the fact that this is a higher than anticipated incidence of occurrence, additional monitoring will be conducted on these 15 to 20 year old loblolly plantations prior to implementation of the project. If additional locally rare species are discovered on these sites, they will be recorded and protected as required.

II. C. 1. Leafy Prairie-Clover (*Dalea foliosa)*

II. C. 1. a. Environmental Baseline

The leafy prairie-clover was federally listed as **endangered** in 1991. This species typically prefers thin-soiled limestone or dolomite glades and limestone barrens. The plant may also be found on wet calcareous barrens and moist prairies or cedar glades, usually near a stream or seepage from limestone that provides seasonal moisture. *Sabatia angularis* and *Rudbeckia triloba* are associates of this species. The plant requires full sun and high competition from other plant species may interfere with the plants ability to reproduce (NatureServe Explorer 2001).

The leafy prairie-clover is a stout perennial herb, 4 - 7 dm tall. The plant has no hair except on the inflorescence. Leaflets of primary leaves are 4 – 10 mm long, flat or loosely folded. Several stems rise out of a hardened root crown. Flower spikes are small, purple and dense. The plant flowers from late July to early August, but may also bloom sporadically into September (Isely 1990).

This species occurs in Tennessee, Alabama, and Illinois. There are 44 occurrences in Tennessee, however, only 17 populations are considered to be marginal or better. Illinois has three known occurrences and there are four different populations in Alabama. In Tennessee and Alabama, the plant tends to be found mainly on open limestone glades and in Tennessee, it may also be found growing on wet calcareous barrens and moist prairies. In Illinois, the plant seems restricted to thin-soiled, wet or moist, open dolomite prairies and on river terraces in the northeastern part of the state (NatureServe Explorer 2001).

Decline of the leafy prairie-clover may be attributed for the most part to habitat destruction and alteration caused by commercial and industrial development, overgrazing, and fire suppression. The species is also greatly threatened by encroachment of exotic species, especially exotic shrub species, particularly privet (*Ligustrum sinense*) and Eurasian bush honeysuckle (*Lonicera maackii*). Fire suppression resulting in succession of other woody vegetation also threatens the populations of the leafy prairie-clover. This species is short-lived and does not spread therefore; population survival is dependent on seed production. Natural communities containing the leafy prairie-clover need to be subjected to periodic prescribed burning to help build a persistent seed bank (NatureServe Explorer 2001).

The species appears to maintain itself only in areas that are naturally or artificially cleared and where hardwood and understory shrubs are at low densities. In Alabama, the majority of the populations are found on cedar glades.

II. C. 1. b. Direct, Indirect, and Cumulative Effects – Leafy prairie clover

All cedar glade communities, habitat for leafy prairie-clover, would be managed in such a manner as to provide protection to any rare plants that may occur there. Several standards for rare communities ensure their maintenance and restoration across the landscape. Rare communities would be protected from detrimental effects caused by management actions across all alternatives. Rare communities have been inventoried in proposed project areas where actions are proposed, which have the potential to adversely affect them. Since federally listed plants receive little or no legal protection on private land, these species may be vulnerable to extirpation.

This plant was not found on any tract by any of the surveys conducted for this project. Since no populations are known to occur on National Forest land, the direct and cumulative effects of National Forest planning alternatives on this plant are likely to be negligible.

II. C. 1. c. Determination of Effect – Leafy prairie clover

Through implementation of the Forest-wide, Rare Community, T&E species and Riparian Standards, the selection of any of the alternatives will have **No Effect** on leafy prairie-clover.

II. C. 2. Eggert's Sunflower (*Helianthus eggertii)*

II. C. 2. a. Environmental Baseline

This plant lives in open oak/pine woodlands and grasslands and was federally listed as threatened in 1997 (USFWS 1997). It blooms in July and August, with flowers (actually composite heads of many small flowers) that are relatively large being about 3.5 inches in diameter, its stem is smooth and waxy, and the tapering leaves with rounded bases are smooth except for a scattered roughness on the upper surface (Pyne, 1998).

The habitat has been described as rocky hills, barrens or open upland oak-pine woods. Soils can be sands, clays, chert or gravel or open upland woods (Kral 1983). The open wood habitats are often dominated by oak forests, specifically white oak, black oak and southern red oaks, as well as hickories and pines. The barrens are openings dominated by perennial grasses and herbs (Jones 1994).

It prefers a habitat type which was presumably more widespread when fire was a more common event in the landscape. This grass and herb-dominated habitat type is grasslands, woodlands and barrens, and is related to the prairies of the Midwest, both in structure, species composition, and ecology (Pyne, 1998). Eggert's sunflower is thought to be a relict species of the fire-dependent barrens habitats, sustained by lightning fires and aboriginal burning at a landscape scale (Jones, 1994).

Presumably, when fire occurred more frequently and large grazing animals roamed free, there were large areas of parts of Tennessee and the Southeast which had relatively few trees, with abundant stands of native grasses and flowering herbs, like composites and legumes (Pyne, 1998). Under present conditions, this community persists on roadsides and recently disturbed areas. In Alabama, this species has been found in Franklin and Winston counties outside of the established administrative boundary of the Bankhead, in open ridge top oak savannahs. Recent surveys of sites to be treated within the Forest Health and Restoration Project did not reveal the presence of this species.

II. C. 2. b. Direct, Indirect, and Cumulative Effects - Eggert's sunflower

Direct impacts to this plant would be minimized by conducting pre-project surveys to determine its presence. Stands to be treated under this project were surveyed and this species was not found on any site. There will be no direct impacts to this species from the project.

The management practices of the Forest Healthand Restoration Project include practices that would be indirectly beneficial to this species. Potential habitat sites would be maintained by prescribed burning activities that are utilized in several alternatives as a management tool to attain the particular desired future condition. Several alternatives call for restoration and maintenance of woodland habitats with understory forbs and grasslands. Expected levels of such restoration and maintenance vary by alternative but all with woodland habitats maintained by tools such as prescribed burning would provide some potential benefit. In addition, glades and barrens, with which this species is sometimes associated, would be protected from direct effects across all alternatives.

Cumulative effects to this species would vary depending upon which alternative were considered. In general, those alternatives with the greatest (largest acreage) usage of prescribed fire for maintaining open woodland conditions would potentially have the greatest beneficial impact to this species. Those alternatives with the least fire activity would tend to limit this plant.

III. C. 2. c. Determination of Effect – Eggert's sunflower

This plant is not known to exist on the Bankhead National Forest. Although it has been found near to the administrative boundary of the Bankhead, all previous plant surveys since 1997 as well as those conducted recently have failed to locate a single remnant plant within the areas to be treated for this project. For that reason, the determination is No Effect on Eggert's sunflower.

II. C. 3. Fleshy-fruit Gladecress (*Leavenworthia crassa Rollins var crassa)*

II. C. 3. a. Environmental Baseline

The Fleshy-fruit glade-cress is listed as a Candidate for federal listing by the USFWS and is on the Regional Forester's Sensitive Species list for the southern region, USDAFS. This is only known to occur in southeastern Lawrence and southwestern Morgan counties in Alabama. This gladecress has been found in two glades on the Bankhead National Forest. It has been reported but believed to be extirpated from Lauderdale County, Alabama (McDaniels et al 1987).

This gladecress is an annual herb occurring on limestone glades, fallow fields and along roadsides on the Cumberland Plateau ecoregion (McDaniels et al 1987). It can be locally abundant in only a few localities within this small range.

Seeds germinate in the fall and form an overwintering rosette of leaves; leaves are mostly basal, pinnately lobed or pinnatifid (Kral 1983). Flowering occurs early March to April. Fruits are less than ½ inch long, fleshy and with a slender apical beak. By summer there is no sign of this winter annual, since it flowers, fruits and dies back early in the season. This gladecress is distinguished from others by the fleshy, almost round fruits, instead of the more elongate, linear, non-fleshy, corrugated fruits of other species (USFS 1996).

Gladecress prefers a sunny, open habitat. Canopy openings around the margins of limestone open and cedar glades should prove beneficial to this species as long as no habitat is altered, rutted, entered by mechanical means or otherwise destroyed. Fire may be beneficial as long as the fuels are not heavy and the fires are not intense or for long duration. Monitoring should be conducted on known populations before and after all burning activities (Kral 1983). Also, if a glade is not actively managed, over time it will become encroached by eastern red cedar and other hardwoods, rendering it too shady for the glade-cress

II. C. 3. b. Direct, Indirect, and Cumulative Effects – Fleshy-fruit gladecress

Surveys were conducted on treatment areas but this species was not found on any site. All glades located within areas proposed for treatment will be identified prior to any management activities. All cedar glade communities, habitat at for fleshy-fruit gladecress, would be physically protected under all alternatives. Several standards for rare communities ensure their maintenance and restoration across the landscape.

Since federal candidate plant species receive little or no legal protection on private land, this species may be vulnerable to extirpation on surrounding glades and suitable habitat. National Forest lands need to be especially cautious to retain and positively manage any habitat for this species.

II. C. 3. c. Determination of Effect – Fleshy-fruit gladecress

It is important to realize that the Fleshy-fruit gladecress is an annual, and thus may be more sensitive to environmental or site-specific events, beyond the control of forest management implementation. Although it has been found within the administrative boundary, plant surveys conducted recently (during its flowering period) have failed to locate a single plant within the areas to be treated for this project. For that reason, the determination of "**no effect "** is implicated for the Fleshy-fruit gladecress when considered as a candidate species. The determination of "no impact" would be applicable for this species when considered as a "sensitive" species.

II. C. 4. Lyrate Bladderpod- *Lesquerella lyrata* Rollins

II. C. 4. a. Environmental Baseline

Lyrate bladderpod was federally listed as **threatened** in 1990. The species is typically found in disturbed limestone outcroppings, cedar glades and glade-like areas, which includes, open pastures, cultivated fields and roadsides in calcareous areas. The plant prefers thin soils covering limestone as well as red soils and is a plant of full sunlight (NatureServe Explorer 2001). This species may be found growing in association with *Juniperus virginiana* and some species of *Leavenworthia* (Kral 1983).

Lyrate bladderpod is an annual herb up to 3 dm in height. The stems are pale green and usually numerous with long, soft hairs. The plant is leafy from the base to the flower head. The basal leaves form a rosette about 4 – 10 cm long and resembles that of a dandelion. Stem leaves are ascending, with entire margins to distantly and coarsely low-toothed, mostly 3 cm long or less. The leaves at the base of the stem are clasping. Leaf color is pale green and has many hairs, especially at the margins and along the midrib beneath. The plant flowers from late February into late April and produces flowers on ascending stalks. The flowers have small weak hairs and are bright yellow with backs that are yellowish-green. The species closely resembles *Lesquerella densipila* in type, amount of hairs, in flower size and color, in pedicel and fruit shape but differs in that it has slightly smaller fruit, together with persistent styles, are perfectly smooth. The seeds are flattened and margined, 2.0 – 2.5 mm long. (Kral, 1983)

In 1983 the only known populations of the lyrate bladderpod were known from cedar glade areas in the eastern part of Franklin county in northwestern Alabama (Kral, 1983). Since that time, this species was reported from Franklin, Lawrence, and Colbert counties, Alabama. Only six populations have been found (NatureServe Explorer, 2001). This plant has never been found within Bankhead National Forest.

Primary threats to the species include woody plant succession and urban and intensive agricultural development that destroys cedar glades. According to Kral (1983), the establishment of pine plantations would probably destroy the plant populations and grazing may cause damage to the species. Potential beneficial management practices, if done properly, might include thinning and cutting of overstory trees and would probably increase populations. They are definitely decreased by intensive row crop agriculture, or by the improvement of lowland pasture with grass species, which would close the canopy.

The species appears to maintain itself only in areas that are naturally or artificially cleared and where hardwood and understory shrubs are at low densities. The majority of the populations are found along roads rights-of-way and in pastures on private land.

II. C. 4. b. Direct, Indirect, and Cumulative Effects – Lyrate bladderpod

All cedar glade communities, habitat at for lyrate bladderpod, would be protected under all alternatives of the project.

Since federally listed plants receive little or no legal protection on private land, this species may be vulnerable to extirpation. Since no populations are known to occur on National Forest land, the direct and cumulative effects of National Forest planning alternatives on this plant are likely to be negligible.

II. C. 4. c. Determination of Effects – Lyrate bladderpod

Through implementation of the Forest-wide, T&E species and Riparian Standards, and the protection of all glade habitats in areas to be treated the selection of any of the alternatives will have **No Effect** on lyrate bladderpod.

II. C. 5. Mohr's Barbara's buttons-*Marshallia mohrii*

II. C. 5. a. Environmental Baseline

Mohr's Barbara's buttons is a federally **threatened** species of moist prairie-like openings in woodlands and along shale-bedded streams in a grass-sedge community. Additionally, several populations are located within, or extend into, road rights-of-ways. Soil associations are typically alkaline sandy clays that are seasonally wet and have a high organic matter content. Plant associations include *Helinium autumnale*, *Helianthus angustifolius*, *Lythrum alatum*, *Ruellia caroliniensis*, and prairie elements such as *Asclepias viridis*, *Asclepias hirtella*, *Helianthus mollis*, and *Silphium terebinthinaceum*.

Mohr's Barbara's buttons is an erect, perennial herb up to 7 dm tall, with a short, thickened, fibrilbearing, erect and thick-rooted rhizome. Stems branch only at the inflorescence and are often purplish. The basal leaves are the longest, 8-20 cm long, with the lowest leaves often clustered toward and around the base, grading gradually upward to shorter stem leaves, then grading into small, oblong or linear inflorescence leaves. The inflorescence consists of 2-10 heads that in full bloom are roughly 2.5 cm broad and 1.5 cm high. The flowers are all discoid, the corollas whitish, with linear, spreading lobes from which project the pale lavender anthers and the narrow, blunt-tipped whitish style branches. The fruit is an achene. Blooming occurs from mid-May through June (Kral, 1983).

At listing, 22 locations were known to occur in Alabama and Georgia in the Cumberland Plateau and Ridge and Valley physiographic regions (USFWS, 1991). One extant population was recently discovered within the administration boundary of the Bankhead National Forest

(Whetstone, 2002, personal communication). Approximately 10 new locations have been found in Georgia since listing (Protected Plants of Georgia).

Primary threats to the species include loss of habitat resulting from fire suppression and conversion of suitable habitat to pine plantations and agricultural land (Protected Plants of Georgia). Drainage of sites where extant populations occur would most likely be detrimental (Kral, 1983). Herbicide use, mowing during the flowering period and installation of underground cable or gas lines also has the potential to impact populations that occur within road rights-of-ways (USFWS 1991).

The species appears to maintain itself only in areas that are naturally or artificially cleared and where hardwood and understory shrubs are at low densities. Historically, fire may have maintained the open conditions required by this plant. Ten populations in Alabama and Georgia are moderate-sized with 100-300 individuals present. The remainder of extant populations support limited populations of 12-50 individuals.

II. C. 5. b. Direct, Indirect, and Cumulative Effects – Mohr's Barbara's buttons

Mohr's Barbara's buttons are associated with riparian and rare communities; therefore, these areas would be protected under all alternatives of the project.

Federally listed plants receive little or no legal protection on private land, thus this species may be vulnerable to extirpation. Since one population is known to occur on National Forest land, and suitable habitat is present for yet unknown populations, the direct and cumulative effects of National Forest planning alternatives on this plant could potentially impact its future existence.

II. C. 5. c. Determination of Effects – Mohr's Barbara's buttons

Through implementation of the Forest-Wide protection mechanisms such as streamside management zones, T&E species and Riparian Standards, the selection of any of the alternatives is **not likely to adversely affect** Mohr's Barbara's buttons.

II. C. 6. White Fringeless Orchid (*Platanthera integrilabia*)

II. C. 6. a. Environmental Baseline

White fringeless orchid (*Platanthera integrilabia*) is listed as a **Candidate** for federal listing by the US Fish and Wildlife Service and is on the Regional Forester's **Sensitive** Species List for the Southern Region. A Conservation Strategy (Bailey, 2001) was developed for this species in 2001 that includes a rangewide summary of existing population information and a comprehensive literature review. Much of the information provided below is taken from that document.

Platanthera integrilabia (Corell) is currently known from a total of sixty-one extant locations within five states (Alabama, Georgia, Kentucky, Mississippi, and Tennessee) and is considered extirpated from three states (North Carolina, South Carolina, and Virginia). Existing populations are summarized in Table BA.P.

Table BA.Q - White Fringeless Orchid

The Distribution of White Fringeless Orchid (Platanthera integrilabia) Populations by State Throughout it's Range.

State	Total Number Of Extant Sites	Total Number of Historic Sites	Total Number Of Extant Sites on Forest Service Lands
Alabama	7	1	6
Georgia	8	1	X
Kentucky	12	3	X
Mississippi	1	2	X
North Carolina	0	3	0
South Carolina	0	1	0
Tennessee	33	9	2
Virginia	0	?	0

Data from State Heritage Programs (Bailey 2001)

Platanthera integrilabia populations occur across a wide geographic area and consequently are found under a diverse array of environmental conditions. Because of this, it is difficult to characterize the specific habitat requirements for any given locale, however, in general plants are found in wet, boggy areas, stream heads, or seepage slopes in acidic muck or sand, in flat or at the bottom of sharply sloped streamside in association with species of *Sphagnum* moss and one or more of the following fern species: Cinnamon fern (*Osmunda cinnamomea*), chain fern (*Woodwardia areolata*), and New York fern (*Thelyptris noveboracensis*).

The rarity of *Platanthera integrilabia* throughout its range may be dependent on a combination of several factors including natural rarity of habitat, habitat loss, low seed germination rates, low flowering and fruit-set rates, and lack of effective pollinators. Habitat loss is recognized as the primary threat to the species rangewide and can be manifested directly through habitat conversion, or indirectly, though alterations to the hydrology at a given site that occur as secondary effects from activities such as road building, timber harvest, mechanical entry, horse logging, rutting, etc. Siltation of habitat, herbivory, and competition from exotic species are other threats that may impact populations.

Like many orchid species, *Platanthera integrilabia* is dependent upon a symbiotic relationship with a fungus for seed germination (Zettler et al. 1990, Zettler and McInnis 1992, Zettler 1994, Currah et al. 1997). While an individual orchid capsule may produce thousands of dust-like seeds, only a tiny fraction of those seeds will be dispersed to a site that supports adequate habitat conditions and the required fungal species for seed germination. While many orchid species have a symbiotic relationship with several different fungal species, it has been suggested (Crock 1996, Zettler 1996) that the distribution of *Platanthera integrilabia* is further limited by the fact that there may be only a single fungal symbiont capable of initiating seed germination. Zettler (1996) showed that both in the lab and under natural conditions only 3% of *Platanthera integrilabia* seeds germinate to produce a seedling plant. Similarly, only a very small percentage of individuals ever flower and set viable seeds. With so many biological constraints affecting the viability of populations, the importance of maintaining existing populations and quality habitat through land management is heightened.

Platanthera integrilabia is known from 1 location on the Bankhead. Surveys performed on the sites proposed for treatment within this project revealed no occurrences of this species.

II. C. 6. b. Direct, Indirect, and Cumulative Effects – White fringeless orchid

A Conservation Strategy (Bailey 2001) that was completed for *Platanthera integrilabia* emphasizes monitoring of existing populations and inventory of suitable habitats to locate new populations. Major threats to Alabama National Forests populations are feral hogs, plant poachers, exotic/invasive plants, and alterations to existing hydrology and timber management activities.

The combination of forest-wide standards and site specific mitigations described above afford necessary protection to *Platanthera integrilabia* populations and habitats from potential negative effects due to forest management activities. Despite this, the species has some inherent biological limitations that could continue to pose risks to its long-term viability, especially at sites where population numbers are low.

Table 1 (in Section 0.1 above) shows that out of 8 extant sites for the species in Alabama, only 6 occur on Forest Service lands. Based upon this, it is apparent that while Forest Service conservation actions may contribute to rangewide viability, they cannot maintain it. Cumulatively, the long-term viability of the species across its range is at great risk.

II. C. 6. c. Determination of Effects – White fringeless orchid

On the National Forests in Alabama, all wetland habitats and known sites for *Platanthera integrilabia* are currently protected. Additionally, pre-project surveys have not found this rare plant on any of the sites proposed for treatment. Potential impacts to individuals remain at all sites through plant poaching. Inherent biological limitations based upon population dynamics may continue to pose risks to the species long-term viability, especially at small sites. Based upon this, under the implementation of any Plan alternative a determination of “no effect” as a candidate species is made for *Platanthera integrilabia*. Also see this species under the “sensitive species” evaluation.

II. C. 7. Kral’s Water-plantain (*Sagittaria secundifolia)*

II. C. 7. a. Environmental Baseline

Kral’s Water-plantain was listed as **threatened** by the USFWS in 1990. It was first listed as occurring in Little River drainage system, but in recent years 3 sites were discovered in the Sipsey fork on the Bankhead National Forest. In the summer of 2000, one additional population was found in Brushy Creek (unpublished CCS reports, USFWS), on the Bankhead National Forest.

This species typically occurs on frequently exposed shoals or rooted among loose boulders in quiet pools up to 1 meter in depth. Plants grow in pure stands or in association with various submergents (Bowker 1991). Flowering is infrequent, and occurs from May into July and intermittently into the fall (Kral 1983). Flowering has only been observed in areas of direct sunlight and at a water level that allows emergent leaves (Whetstone 1988).

Sphagnum seeps are frequently found with this species, and it prefers areas with stream bottoms that are narrow and bounded by steep slopes. Extant populations have only been found to occur on underlying formations of Pottsville sandstone (Bowker 1991). Eight of the twelve populations on the Little River system occur in pools or in riverine areas with partial canopy coverage. The remaining 4 occur in shallow shoals, supporting several dozen plants (Whetstone 1988).

II. C. 7. b. Direct, Indirect, and Cumulative Effects – Kral's water-plantain

The most severe threat to this species is the elimination or adverse modification of the already limited habitat. Clearing, sedimentation, hydrological function alteration and similar impacts have already caused the extirpation of at least one population (Kral 1983). Extreme water turbidity and dense filamentous algae decrease the amount of light available to the plants for growth and flowering.

Impoundments may have destroyed additional undocumented populations, since populations have been found above and below impoundments currently in place (Bowker 1991). These populations are particularly vulnerable to single disaster or human caused disturbances which could conceivably wipe out over a third of the known populations in a single event. Thus it is even more critical that the populations that occur on federal lands be protected and managed to retain and improve habitat critical to this species.

II. C. 7. c. Determination of Effects – Kral's water-plantain

The sites which have been found on the Bankhead all occur on the mid-reaches of the Brushy and Sipsey Rivers, above the Smith Lake impoundment. Due to the habitat favored by the Kral's water plantain, and the strict protection of these sites that would be part of any of the alternatives of this project, the determination of "**No Effect**" is made for Kral's water plantain.

II. C. 8. Alabama Streak-sorus Fern (*Thelypteris pilosa var alabamensis)*

II. C. 8. a. Environmental Baseline

The Alabama Streak-sorus fern was federally listed as **threatened** in 1992 It was first discovered in 1949 on sandstone cliffs above the Sipsey Fork, in Winston County, Alabama. Construction of a bridge destroyed the type locality, and it was believed to have been extirpated until its rediscovery approximately 8 miles upstream (Short & Freeman 1978). Subsequent field surveys have found at least 15 other sites along 4 miles of the Sipsey Fork, however this species has not been found elsewhere, despite numerous field surveys.

The Alabama Streak-sorus fern is a relatively small spray-cliff fern. It differs from other *Thelypteris* species in that it has no indusia, and having sinuses of the pinnule margins reached by one lateral vein rather than by two (Smith 1993, Kral 1983). It is confined to Pottsville sandstone formations and requires high substrate moisture, high humidity and shade. Plants are located within crevices or fissures, on ceilings and recessed walls or ledges on overhangs associated with small waterfalls. Occasionally plants could be found in moist seepage areas on exposed vertical rock faces. It is a spray-cliff dependent species, and must have moisture by seepage, humidity, shade, but also adequate diffuse light. The herbaceous species assemblage of the sandstone overhangs is part of the river gorge's well developed hemlock forest association (Kral 1983, Gunn 1997).

II. C. 8. b. Direct, Indirect, and Cumulative Effects – Alabama streak-sorus fern

The Alabama streak-sorus fern is known only to occur in Winston County, Alabama. The type locality was destroyed, but subsequent work by the Alabama Natural Heritage program revealed 17 distinct extant occurrences distributed along 4 miles of the Sipsey Fork (Gunn 1997). This plant was not found in any of the surveys of the proposed areas to be treated under this project. The minimum historical distribution is assumed to include this area plus the stretch of the stream which is now inundated by the Smith Lake impoundment. It is probable that the species also occurred downstream, and perhaps even on the Brushy Creek or Rockhouse Creek (Gunn 1997).

The Alabama Streak-sorus fern is found primarily on a single drainage on the Bankhead National Forest. The Sipsey River contains the only populations known in the world. It is thought that water impoundments on streams in the Black Warrior River drainage have destroyed a large number of fern colonies, and it is vulnerable to any activities that would change the hydrology of its habitat and dehydrate its microhabitat (USFS, 1997).

II. C. 8. c. Determination of Effects – Alabama streak-sorus fern

The section of the Sipsey River, above the Smith Lake impoundment on the Bankhead National Forest is the only known site in the world to contain the Alabama streak-sorus fern. The overall greatest threat is described as its vulnerability to a single natural or human-induced disturbance, given its extremely restricted range and the relatively small number of plants that make up its total population (USFS 1997). Given that a single catastrophic event could produce negative results, it is possible that any management action other than protection, including that which results in an increase in the lake level could destroy all or a portion of this species. Management activities for the Forest Health and Restoration Project will not impact habitats where this plant occurs. Neither plants nor their habitat were found during any of the surveys conducted for this project. However, the actions associated with this project would provide strict protection to the riparian areas which this plant is found. Thus the determination is of "**No effect**" for the Alabama Streak-sorus fern.

II. C. 9. Tennessee Yellow-Eyed Grass (*Xyris tennesseensis)* Kral

II. C. 9. a. Environmental Baseline

The Tennessee Yellow-eyed Grass (*Xyris tennesseensis*) was first described as a separate species by Robert Kral in 1978. It was listed as an **endangered** species in 1991.

The Ridge and Valley physiographic region is a key area for this species, as are portions of the Highland Rim & Upper Gulf Coastal Plain. There are less than 4 locations documented in Georgia (Bartow & Whitfield counties), two documented locations in Tennessee (Lewis county) and less than 12 locations documented in Alabama. Nine of the Alabama sites are located in three Alabama counties – Franklin, Calhoun & Bibb, all of which are counties-of-occurrence for the Bankhead National Forest, the Shoal Creek & Talladega Districts and the Oakmulgee District, respectively. This alone represents over half of the sites known worldwide. The Gordon county, Georgia population is considered to be extirpated, as is one of the Bartow county, GA populations (Kral, 1990).

The Georgia populations and the majority of the Alabama populations are located within the Ridge & Valley. However, the populations in Franklin County, Alabama and the Bibb County sites, just below the fall line, occur in the Upper Gulf Coastal Plain (Kral, 1990).

The Tennessee Yellow-eyed Grass is a perennial herb with basal, erect linear leaves (NatureServe, 2002). The plant typically occurs in clumps, with the leaves clustered at the bulbous base, the outermost leaves being small and having a dark purplish-maroon to pinkish red scale-like appearance (Patrick et al, 1995). The inner leaves are larger and linear in shape, varying in length from 3-18 inches long, deep green in color, and slowly twisting as it ascends up the stalk (Gothard, 1995). The unbranched flowering inflorescence consists of brown cone-like spikes, single at the tips of each one to three foot tall flower stalk, containing small, pale yellow flowers (three petals) which open in the morning, wither in the afternoon, and only appear a few at a time (Somers, 1993, Gothard, 1995). Roots are slender, shallow & fibrous (Kral, 1983). Fruits are obovoid or broadly ellipsoid capsules with thin, plano-convex walls and three sutures, with numerous ellipsoid seeds covered by 18-20 fine, longitudinal lines that are sometimes interconnected (Kral, 1983, Somers, 1993). Blooming occurs from August to September, with fruiting from September to October.

All yellow-eyed grasses require habitats that are moist to wet year round, ranging from sunny to partial shade or very thinly wooded (with little canopy cover) conditions. Preferred landforms include drains, swales, seeps, springs, springy meadows, bogs, fens and banks of small streams. The Tennessee Yellow-eyed Grass differs from other Xyridaceae in that instead of preferring acidic sites, it is found where calcareous rock such as shale, limestone and dolomite are at, near or have been deposited near the soil surface, or where thin calcareous soils are present (NatureServe 2002, Somers 1993). This character results in soils that are more neutral to basic than acidic (Gothard, 1995). Community types include seepage slopes, springy meadows, bogs and streamsides (Kral, 1983, Natureserve 2002). Substrates include gravelbars, sandbars, shallow sand/soil deposits or cracks in the limestone, narrow sandbars located on ketone dolomite, wet ditches of mixed clay and sand, and rich deposits of marshland. One site occurs on an earth dike in an impounded swamp. Soils are slow to establish and prone to erode during heavy rain events because most sites are wet and relatively steep (Somers, 1993). The sites tend to be open, wet disturbance or open-canopy early successional-related herbaceous understory habitats, with an abundant herbaceous layer and few woody shrubs and a thin canopy of trees.

Where populations of Tennessee Yellow-eyed Grass occur along separate parts of the same stream, continuous corridors of suitable habitat are not available and they are often widely separated (USFWS 1994). In these instances, propagules may move downstream to mix with those of other populations or colonize suitable habitat where it exists, however only seldom would there be opportunity for upstream movement of propagules or pollinators from site to site (Somers, 1993).

Despite extensive surveys, fewer than 20 populations are known to be extant, with each site occupying less than ½ an acre. Only one site is known to contain more than a few hundred plants, with at least three containing less than 20 individuals (Kral, 1990, Patrick et al, 1995). Due to the small size of most of these population sites, Kral suggested that Tennessee Yellow-eyed Grass was historically rare throughout it's range. Three historical populations have been lost, and at least 4 of the remaining populations are in decline due to highway construction/right-of-way maintenance and other habitat destruction (NatureServe, 2002). In addition to sites lost during road construction, other significant habitat losses have been sustained as a result of drainage of lowland wetlands, conversion to agricultural fields, careless forest management practices and impoundment of wetlands (Patrick et al, 1995, Kral 1990, NatureServe 2002, USFWS 1994).

II. C. 9. b. Direct, Indirect, and Cumulative Effects – Tennessee yellow-eyed grass

The endangered status of the Tennessee Yellow-eyed Grass is primarily a result of its apparent limited distribution and the fragile nature of the habitat upon which it depends (Gothard, 1995). The activities responsible for loss of habitat are varied but they all lead to habitat destruction through conversion or loss of the original hydrological function. For the Tennessee Yellow-eyed Grass, ground disturbing activities, impoundments, road construction have the greatest potential to affect both individuals and populations. The other sources of habitat modification or destruction, described above, are not permitted on National Forest lands.

Based on the plant's wetland habitat and the general biology of yellow-eyed grasses collectively, Tennessee yellow-eyed grass could be positively managed by protecting sites from encroachment by woody shrub species leaving a partial (or thinned) overstory canopy in place and ensuring that activities taking place in areas where the plant occurs do not adversely affect the hydrology of the site (Moffett, 2002). Management options would include hand removal of woody midstory/shrub encroachment, thinning based on site-specific recommendations and mitigation, and burning. Total canopy removal is not recommended (Moffett 2002).

There are no known populations located on the National Forests in Alabama, however there is a site within 2 miles of the Bankhead National Forest. Habitat meeting the general description necessary for the Tennessee Yellow-eyed Grass is present on the Bankhead National Forest.

Protection and surveys for habitat and new populations will be included in our recovery objectives. Surveys of stands to be treated did not indicate the presence of this plant. All ground disturbing activities that occur on National Forest lands will employ the Forest-Wide and Riparian Standards. Implementation of these standards will be monitored and corrected as needed or as new information becomes available.

The effects of management show that although total canopy cover removal induces enhanced flowering of the Tennessee Yellow-eyed Grass for the first year following the action, subsequent years show that the woody encroachment and other herbaceous species out-compete this species, resulting in a decline (Moffett, 2002). Prescribed burning during the winter and early spring (opposite the flowering period) seem to produce positive results, as does careful midstory removal, taking care to keep soil compaction to a minimum and allowing no rutting to occur.

II. C. 9. c. Determination of Effects – Tennessee yellow-eyed grass

Surveys conducted on areas proposed for treatment under this project, did not locate this species nor its habitat. Through implementation of the Forest-Wide, T&E species and Riparian Standards, and due to the fact that there are no sites found directly on National Forests in Alabama lands, the selection of any of the alternatives will have **No Effect** on the Tennessee Yellow-eyed Grass (*Xyris tennesseensis*).

Table BA.R - Determination of Effects for Federally Listed Aquatic and Terrestrial Plants

Scientific Name	**Common Name**	**Determination of Effects**
Dalea foliosa	Leafy prairie clover	No Effect
Helianthus eggertii	Eggert’s sunflower	No Effect
Lesquerella lyrata	Lyrate bladder-pod	No Effect
Marshallia mohrii	Mohr’s Barbara’s buttons	No Effect
Sagittaria secundifolia	Kral’s water-plantain	No Effect
Thelypteris pilosa var al.	Alabama streak-sorus fern	No Effect
Xyris tennesseensis	Tennessee yellow-eyed grass	No Effect
Leavenworthia crassa	Fleshy-fruit gladecress (Candidate species)	No Effect
Platanthera integrilabia	White fringeless orchid (Candidate species)	No Effect

REFERENCES

Terrestrial Animals:

Red-cockaded woodpecker:

Costa, R. and R.E.F. Escano 1989. Red-cockaded woodpecker: status and management in the southern region in 1986. U.S. Dept. of Agric., Forest Service. Tech. Pub. R8-TP 12, Southern Region, Atlanta, GA.

Costa, Ralph. 2001. Red-Cockaded Woodpecker. Pp 309-321. In J.G. Dickson (ed.). 2001. Wildlife of Southern Forests: Habitat and Management. Hancock House Pub. Blaine, WA.

Escano, Ronald E.F. 1995. Red-cockaded Woodpecker Extinction or Recovery: Summary of Status and Management on Our National Forests. Pp. 28-35. *In* D.L. Kulhavy, R.G. Hooper, and R. Costa (eds.). 1995. Red-cockaded Woodpecker: Recovery, Ecology and Management, Proceedings of the Third Red-cockaded Woodpecker Symposium. Center for Applied Studies in Forestry, Stephen F. Austin State University. Nacogdoches, TX. 507 p.

Hamel, Paul B. 1992. Land Manager's Guide to the Birds of the South. The Nature Conservancy, Southeastern Region, Chapel Hill, NC.

Loeb, S.C., W.D. Pepper, and A.T. Doyle. 1992. Habitat characteristics of active and abandoned red-cockaded woodpecker colonies. South. J. Appl. For. 16:120-125.

Noel, J.M., W.J. Platt, and E.B. Moser. 1998. Structural characteristics of old- and second-growth stands of longleaf pine (Pinus palustris) in the Gulf coastal region of the U.S.A. Conservation Biology 12:533-548.

U.S. Fish and Wildlife Service. 2000. Technical/Agency Draft Revised Recovery Plan for the Red-cockaded Woodpecker (Picoides borealis). U.S. Fish and Wildlife Service. Atlanta, GA. 229 p.

U.S. Department of Agriculture, Forest Service. 1995. Final Environmental Impact Statement For the Management of the Red-cockaded woodpecker and its Habitat on the National Forests in the Southern Region. Management Bulletin R8-MB 73. 407 p.

Ware, S., C. Frost, and P.D. Doerr. 1993. Southern mixed hardwood forest: the former longleaf pine forest. Pp. 447-493 in W.H. Matin, S.G. Boyce, and A.C. Echternacht, eds. Biodiversity of the southeastern United States: lowland terrestrial communities. John Wiley and Sons, Inc., New York, NY.

Bald eagle:

Andrew, J. M. and J. A. Mosher. 1982. Bald Eagle nest site selection and nesting habitat in Maryland. J. Wildl. Management. 46:382-390.

Buehler, D.A., T.J. Mersmann, J.D. Fraser, J.K.D. Seegar. 1991. Effects of human activity on bald eagle distribution on the northern Chesapeake Bay. J. Wildl. Manage. 55:282-290.

Byrd, M. A., and D. W. Johnston, 1991. Birds. Pages 477-537 in K. Terwilliger, coordinator. Virginia's endangered species: proceedings of a symposium. McDonald and Woodward Publ. Co., Blacksburg, Virginia.

Campbell, R. W., N. K. Dawe, I. McTaggert-Cowan, J. M. Cooper, G. W. Kaiser, and M. C. E. McNall. 1990. The Birds of British Columbia. Volume 1. Nonpasserines: Introduction and loons through waterfowl. University of British Columbia Press, Vancouver, BC, Canada. 514pp.

Green, N. 1985. The Bald Eagle. Pp. 508-531 in R.L. DiSilvestro, ed., Audubon Wildlife Report 1985. National Audubon Society, New York.

Imhof, Thomas A. 1976. Alabama Birds. State of Alabama Department of Conservation and Natural Resources, The University of Alabama Press, Tuscaloosa Alabama. 425 pp.

NatureServe Explorer: An online encyclopedia of life [web application]. 2001. Version 1.6. Arlington, VA, USA: NatureServe. Available:http://www.natureserve.org/explorer. (Accessed: September 2002).

U.S. Fish and Wildlife Service. 1995. Endangered Species Success Story. Biologue Series.

U.S. Fish and Wildlife Service. 1999. Proposed rule to remove the Bald Eagle in the lower 48 states from the endangered and threatened wildlife. Federal Register 64:36453-36464.

U.S. Fish and Wildlife Service. 1996. Revised recovery plan for the U.S. breeding population of the wood stork. U.S. Fish and Wildlife Service. Atlanta, Georgia. 41p.

NatureServe Explorer: An online encyclopedia of life [web application]. 2001. Version 1.6. Arlington, VA, USA: NatureServe. Available:http://www.natureserve.org/explorer. (Accessed: September 2002).

Hamel, P. B. 1992. Land manager's guide to the birds of the South. The Nature Conservancy, Southeastern Region, Chapel Hill, NC. 437 pp.

Indiana Bats:

Barbour R. and Davis W. 1969. Bats of America. University Press of Kentucky, Lexington, Kentucky. 286 pp.

Callahan III E., R. Dabney, and R. Clawson. 1997. Selection of summer roosting sites by Indiana bats (*Myotis sodalis*) in Missouri. J. Mamm. 78:818-825.

Cochran, S., G. Libby, H. Bryan, J. MacGregor, and J. Spencer. 2000. A Survey for the Federally Endangered Indiana Bat (*Myotis sodalis*) on the Nolichucky-Unaka and Tellico Ranger Districts of the Cherokee National Forest, Tennessee. Ecotech, Inc. Frankfort, KY.

Libby, G. , H. Bryan, J. Spencer, S. Cochran, P. Droppelman, and J. MacGregor. 2000. A preliminary mist net survey and radio-telemetry study for the federally endangered Indiana bat (*Myotis sodalis*) on Tapoco Incorporated, Lands in Graham and Swain counties, North Carolina and Blount and Monroe counties, Tennessee. Prepared for the Nature Conservancy of Tennessee. 17 pp.

MacGregor J., J. Kiser, M. Gumbert and T. Reed. 1999. Autumn roosting disturbance, prescribed burning, and management in the Daniel Boone National Forest, Kentucky. Abstract in the Proceedings of the Central Hardwoods Forest Conference, hosted by University of Kentucky, Lexington.

Menzel, M., J. Menzel, T. Carter, W. Ford, and J. Edwards. 2001. Review of the Forest Habitat Relationships of the Indiana bat (*Myotis sodalis*). GTR NE-284. Newton Square, PA: USDA Forest Service, Northeastern Research Station. 21 pp.

USDI Fish and Wildlife Service. 1983. Indiana Bat Recovery Plan. Rockville, MD.

USDI Fish and Wildlife Service. 1997. Biological Opinion on the impacts of forest management and other activities to Indiana bat on the Cherokee National Forest, Tennessee. Cookeville, TN. February 1997.

USDI Fish and Wildlife Service. 1999. Agency Draft Indiana Bat Revised Recovery Plan. Ft. Snelling, MN. Draft dated March 1999.

USDI National Park Service. 2002. Pers. Comm., Kim Delozier, Great Smoky Mountains National Park, Gatlinburg, TN.

Gray Bats:

Best, T., W. Cvilikas, A. Goebel, T. Hass, T. Henry, B. Milam, L. Saidak, and D. Thomas. 1995. Foraging Ecology of the Endangered Gray Bat (*Myotis grisescens*) at Guntersville Reservoir, Alabama. Joint Agency Guntersville Project Aquatic Plant Management (Tennessee Valley Authority and US Army Corps of Engineers).

Currie, R, and M. Harvey. Gray bat (*Myotis grisescens*) Status Review. Unpublished working paper, February 21, 2002. USDI Fish and Wildlife Service, Asheville, NC.

LaVal, R., R. Clawson, M. LaVal, and 2. Caire. 1977. Foraging behavior and nocturnal activity patterns of Missouri bats, with emphasis on the endangered species *Myotis grisescens* and *Myotis sodalis*. J. Mamm. 58:592-599.

USDI Fish and Wildlife Service. 1982. Gray Bat Recovery Plan. Denver, CO.Mitchell’s Satyr

[TNC, ALNHP] The Nature Conservancy, Alabama Natural Heritage Program. 2002. A Survey for the Mitchell’s Satyr (Neonympha mitchelli, FRENCH) in the National Forests of Alabama: An Interim Progress Report. 55 p.

Roble, S. M., C. T. Kessler, B. Grimes, C. S. Hobson, and A. C. Chazal. 2001. Biology and conservation status of *Neonympha mitchellii*, a globally rare butterfly new to the Virginia fauna. Banisteria 18: 3-23.

Shuey, J. A. 1997. Conservation status and natural history of Mitchell's satyr,

Neonympha mitchellii mitchellii French (Insecta: Lepidoptera: Nymphalidae). Natural Areas Journal 17(2):153-163.

[USFWS] U.S. Fish and Wildlife Service.1996. Saint Francis' Satyr Recovery Plan. Atlanta, GA. 27pp.

[USFWS] U.S. Fish and Wildlife Service. 1998. Recovery Plan for Mitchell's Satyr Butterfly (*Neonympha mitchellii mitchellii* French). Ft. Snelling, MN. viii+71pp.

Opler, P. A. and V. Malikul. 1992. A Field Guide to Eastern Butterflies. Houghton Mifflin, New York, NY.

Scott, J.A. 1986. The Butterflies of North America. A Natural History and Field Guide. Stanford University Press. Stanford, California.

Biological Evaluation

of

Sensitive and Locally Rare Species

Forest Health And Restoration Project

Bankhead National Forest

Franklin, Lawrence, and Winston Counties, Alabama

Introduction

A biological evaluation is a documented review of programs or activities to determine the effect on sensitive and locally rare species and to determine their viability. The purpose and need for this Forest Health and Restoration Project is described within Chapter 1 of the Environmental Impact Statement. The various alternatives are fully described within Chapter 2 of that document. This Biological Evaluation (BE) addresses the effects of the Project and its associated management activities.

The need to conduct site-specific inventories of those federally listed species (threatened, endangered or candidate), the species designated by Forest Service as regionally sensitive, and locally rare species, for this project was assessed using direction in Forest Service Manual Supplement R8-2600-2002-2. Based on this assessment, affected potential habitat in the project area was inventoried for presence of the species as noted within this document. Professional botanists and wildlife biologists were contracted to make field examinations. Survey results and field notes were too voluminous for inclusion here and thus are located in the project file. Any area containing glades, rock outcrops, aquatic areas, riparian areas or wetlands, which are habitats where many protected, threatened, endangered, sensitive and locally rare species are typically found, were identified. These areas will receive due protection as required throughout implementation of the Forest Health and Restoration Project.

The objective of this biological evaluation is to examine possible effects resulting from implementation of each alternative outlined within the Environmental Impact Statement on protected sensitive and locally rare species of plants and wildlife. This evaluation is to ensure that Forest Service actions do not contribute to the loss of viability of any native or desired non-native plant or animal species or trends towards federal listing of any species. This complies with the requirements of the Endangered Species Act of 1973 and the National Environmental Policy Act. It also provides a process and standard by which to ensure that threatened, endangered, proposed, sensitive and locally rare species receive full consideration in the decision making process.

A description of the sites proposed for treatment (loblolly stands to be thinned and Southern Pine Beetle Areas to be restored) is included within the main body of the Environmental Impact Statement. Management actions proposed through this Forest Health and Restoration Project include prescribed burning, site preparation, reforestation, and thinning and associated temporary road construction. Desired future conditions (landscape conditions) that will result from implementation of this initiative include:

- Mixed Mesophytic Forests
- Conifer-Northern Hardwood Forests
- River Floodplain Hardwood Forests
- Dry-Mesic Oak Forests
- Dry and Dry-Mesic Oak-Pine Forests
- Dry and Xeric Oak Forest and Woodlands
- Xeric Pine and Pine-Oak Forest and Woodlands (Shortleaf Pine/Bluestem Woodlands)
- Upland Longleaf Pine/Bluestem Woodlands

Mitigation which is common to all alternatives included with this Project are described within Chapter 2 of the Environmental Impact Statement. Monitoring measures for biological resources are discussed within Chapter 3 of the Environmental Impact Statement.

CONSULTATION HISTORY and SURVEY INFORMATION

Biological surveys and evaluations have been conducted on the Bankhead National Forest for previous projects over a period of many years. Site-specific biological surveys were conducted as a part of this evaluation and Environmental Impact Statement development. A listing of all known locations of endangered, threatened, sensitive, and locally rare species on the Bankhead is maintained at the District Office in Double Springs. These records were reviewed as a part of this evaluation. The USDA Forest Service has consulted with the U.S. Fish and Wildlife Service as a part of this project regarding Federally listed species. Many species of sensitive and locally rare plants are found within the same habitats as the Federally listed species. Consultation with the U.S. Fish and Wildlife Service is not required for sensitive and locally rare species.

Project level inventories were conducted to gather information on the presence or absence of protected species (federally listed, Forest Service sensitive and locally rare) within the area affected by the project. All loblolly pine stands with project activities planned were evaluated.

Biological surveys have been completed for 100% of loblolly pine stands between the ages of 21 and 45 years, which are planned to be treated by an activity that causes ground disturbance. This includes thinning of pine stands and the site preparation activities, such as drum chopping and site preparation burning, which will be required for restoration treatments.

In addition, survey methodology called for sampling of sites comprised of loblolly pine plantations which are between 15 and 20 years of age. These loblolly stands are at the age where a majority of the shrub and herbaceous understory is absent. This is due to the thick and bushy growth of pine trees at this age, which prevents sunlight from reaching the forest floor, effectively reducing the development of an understory. Based upon experience and field reviews conducted on Bankhead National Forest, these stands were determined by the Forest Botanist and the Bankhead District Wildlife Biologist as the stands with the lowest likelihood for occurrence for protected species. Field surveys were performed on 48% of the acreage of these sites. Consistent with the biologist's recommendation, no federally listed or Forest Service sensitive species were found during surveys. However, a small percentage of the sites were found to have some of the locally rare species within or adjacent to the stand (Blue Ridge trillium, silky camellia, small head gayflower, pinesap, little leaf alum root and Nestronia). Due to the fact that this is a higher than anticipated incidence of occurrence, additional monitoring will be conducted on these 15 to 20 year old loblolly plantations prior to implementation of the project. If additional locally rare species are discovered on these sites, they will be recorded and protected as required.

SPECIES EVALUATED

All species listed by the Fish and Wildlife Service in accordance with the Endangered Species Act of 1973 (as amended), as threatened, endangered or candidates which have either known or historic range within the proclamation boundary were considered for evaluation. All species from the Regional Forester's Southern Region Sensitive Species List that potentially occur within the Bankhead National Forest were considered for evaluation. Those Locally Rare Species as identified by the Forest Service were considered for evaluation. Some species from these lists occur within habitats and locations that are not found on the Bankhead National Forest. Each of the respective species, which are known to be found or have historical habitats on the Bankhead National Forest were considered in this evaluation. In such cases, these species have either been found on Bankhead in the recent past or the historical habitat range includes Bankhead. All habitats for upland and aquatic plant and wildlife species were considered. Species associated with glades, rock outcrops, cliffs, seeps, springs, and streamside habitats were evaluated although these habitats will be protected during the implementation of the Forest Health and Restoration Project and will not be impacted.

SENSITIVE SPECIES – BANKHEAD NATIONAL FOREST

A list of terrestrial Forest Service “Sensitive” species known, or suspected, to occur, on or near the Bankhead National Forest :

Table BE.A - Forest Service Sensitive Species List - Terrestrial

Common Name	Scientific Name	Status/Rank	Habitat
Small flowered buckeye	*Aesculus parviflora*	S2S3G2G3	18
Tennessee Milkvetch	*Astragalus tennesseensis*	S1G3	6
Spreading yellow false foxglove	*Aureolaria patula*	S1G2G3	7
Bryson’s sedge	*Carex brysonii*	S1G1	18
Alabama larkspur	*Delphinium alabamicum*	S2G2	6
Riverbank bush-honeysuckle	*Diervilla rivularis*	S2G3	11
Gorge filmy fern	*Hymenophyllum tayloriae*	S1G1G2	7
Butternut	*Juglans cinerea*	S1G3G4	18
Alabama Gladecress	*Leavenworthia alabamica var. ala*	T2T3G2G3	6
Fleshy-fruit Gladecress	*Leavenworthia crassa*	CS1G2	6
Duck River Bladderpod	*Lesquerella densipila*	SHG3	6
Sweet pinesap	*Monotropsis odorata*	G3	19
Nevius’ stonecrop	*Sedum nevii*	S3G3	7
White fringeless orchid	*Platanthera integrilabia*	CS2G2G3	2
Yellow fringeless orchid	*Platanthera integra*	G3G4	2
Alabama snow-wreath	*Neviusia alabamensis*	S2G2	6
Alabama skullcap	*Scutellaria alabamensis*	S2G2	7
Blue Ridge catchfly	*Silene ovata*	S1G2G3	7
Jeweled Trillium	*Trillium simile*	G3	18
Menge’s fameflower	*Talinum mengesii*	S2S3G3	6

Common Name	Scientific Name	Status/Rank	Habitat
Little mountain meadow rue	*Thalictrum mirabile*	QS1G2G3	7
Clammy Locust	*Robina viscose*	G3	17
Limestone Fameflower	*Talinum calcaricum*	S2G3	6
Lanceleaf Trillium	*Trillium lancifolium*	S2S3G3	11
Broadleaf Barbara's Buttons	*Marshallia trinervia*	S3G3	11
Diana Fritillary	*Speyeria diana*	S3G3	11
Rafinesque's Big-eared Bat	*Corynorhinus rafinesquii*	G3G4 S2	10
Scott's Spleenwort	*Asplenium x ebenoides*	HYBS1	7
Pinnate-lobed Black-eyed Susan	*Rudbeckia triloba var pinnatiloba*	S2S3G4T2	7

<u>Key to Table Above - Habitat Associations</u>
1= Cave Habitats
2= Wetland (Bog) Habitats
6= Glades, Prairies, and Woodland Habitats
7= Rock Outcrop and Cliff Habitats
8= Grass/Forb Habitats
10= Mid- to Late- Successional Deciduous Forest Habitats
11= Forest Riparian Habitats
12= Habitat Generalist
13= Area Sensitive Mid- and Late-Successional Deciduous Forest Habitats
17= Southern Yellow Pine Forests and Woodland Habitats
18= Mixed Mesic Forest Habitats
19= Mixed Xeric Forest Habitats
20=Shrub/Seedling/Sapling Habitats
21=Seeps and Springs

A list of aquatic Forest Service "Sensitive" species known, or suspected, to occur, on or near the Bankhead National Forest:

Tabel BE.B - Forest Service Sensitive Species List - Aquatic

Common/Scientific Name	**Ranking**	**Common/Scientific Name**	**Ranking**
Cocoa clubtail *Gomphus hybridus*	S3S4G3G4	A liverwort *Riccardia jugata*	G1G2
A caddisfly *Hydroptila paralatosa*	S2G2	Alabama Jamesianthus *Jamesianthus alabamensis*	S3G3
A caddisfly *Rhyacophila carolae*	S1G1	Longhead darter *Percina sp. cf. macrocephala*	G3
Alabama spike *Elliptio arca*	S2G3	Southern Hickorynut *Obovaria jacksonian*	S2G1G2
Southern creekmussel *Strophitus subvexus*	S2G3	Alabama Hickorynut *Obovaria unicolor*	S2G3
Alabama rainbow *Villosa nebulosa*	S3G3	Black Warrior waterdog *Necturus alabamensis*	S1G2
A liverwort *Aneura maxima*	G1G2	Warrior darter *Etheostoma bellator*	S2G2
A liverwort *Cheilolejeunea evansii*	S1G1	Tuskaloosa Darter *Etheostoma douglasi*	S2G2
A liverwort *Pellia X appalachiana*	G1	Rush Darter *Etheostoma phytophyllum*	S1G1
A liverwort *Plagiochila echinata*	G2	Tuscumbia darter *Etheostoma tuscumbia*	S2G2
A liverwort *Radula sullivantii*	G2		

Some species are of concern although not listed as threatened or endangered by the FWS. They have been ranked Globally as G1, G2 or G3 by the Natural Heritage Network of The Nature

Conservancy, which means viability concerns throughout their entire range. This may be due to habitat requirements, range limits or particular vulnerability to activities. These species have been listed by the Regional Forester as Sensitive and require special consideration in order to ensure that viability is not impaired and to preclude any trend toward the necessity of their being proposed for listing as threatened or endangered by the FWS. According to the Natural Heritage Network rankings, G1 species are critically imperiled globally because of extreme rarity (typically less than 5 occurrences, less than 1,000 individuals or very few remaining acres) or because of some factor(s) making them especially vulnerable to extinction. Species ranked G2 are imperiled globally because of extreme rarity (typically 6-20 occurrences, 1,000 to 3,000 individuals or few remaining acres) or because of some factor(s) making them very vulnerable to extinction. Species ranked as G3 are rare or uncommon (typically 21-100 occurrences or 3,000 to 10,000 individuals) throughout its range; or found locally, even abundantly, in a restricted range (e.g. in a single state or physiographic region); or vulnerable to extinction throughout its range because of specific factors. G4 ranking indicates apparently globally secure. Rankings begin with a T instead of a G are used for subspecies and two rankings together, such as G2G3, indicates uncertainty in the ranking of that species. A question mark (?) indicates some doubt concerning the status of the species or subspecies. HYB indicates a hybrid. Rankings preceded by an S indicate the status inside the state of Alabama as determined by the Alabama Natural Heritage Program. The list of plant and animal species is based upon the Southern Region Sensitive Species.

TERRESTRIAL SENSITIVE SPECIES – Considered but not Evaluated

Species listed below were initially considered but were dropped from further evaluation for the reasons noted within. Generally these are species that potentially have habitat here but have never been found within Bankhead National Forest. Habitats would not be impacted by project.

SCOTT'S SPLEENWORT

Environmental Baseline

This species is associated with rock outcrops and cliff habitats. It is found in cool rock crevices (limestone, sandstone, or conglomerate cliffs) with a northern exposure. It is also associated with moist, shady habitats. It is not known from Winston, Lawrence or Franklin counties, but has been encountered in Jefferson County. Rock outcrops and cliff habitats will be protected during this project, and no impact to associated species will occur. This species was not encountered during biological surveys of project areas.

SPREADING YELLOW FALSE FOXGLOVE

Environmental Baseline

This species has been encountered in Cherokee County. Other species of *Aureolaria* are found on a variety of sites from upland hardwoods to sandy sites of the coastal plain. This particular species is found on river bluffs in Tennessee. It is not known from the Bankhead National Forest or surrounding areas. This species was not encountered during biological surveys of project areas.

ALABAMA LARKSPUR

Environmental Baseline

This species is associated with cedar glades, limestone or sandstone outcrops, sandstone cliffs or rocks. The larkspur is found in prairies, limestone cedar glades or open woods bordering these habitats. Glades will be protected during project activity. This species has not been encountered on the Bankhead and was not encountered during biological surveys of project areas.

TENNESSEE MILKVETCH

Environmental Baseline

This species is known from limestone glades in Morgan County. Potential habitat exists within the Bankhead National Forest, but the species is not known to occur here. Glades are a protected rare community type that will not be impacted through activities associated with this project. This species was not encountered during biological surveys of project areas.

DUCKRIVER BLADDERPOD

Environmental Baseline

This species is known to occur in Franklin and Marshall counties in calcareous fields and pastures. It has not been encountered within the Bankhead National Forest and is not expected to occur within the project area. *No impact* is anticipated as the appropriate habitat does not exist within the project area. This species was not encountered during biological surveys of project areas.

ALABAMA SNOW-WREATH

Environmental Baseline

This plant is known to occur in limestone woodlands and on bluffs. This species has not been recorded in Winston, Lawrence or Franklin counties. It has been recorded from DeKalb, Jackson, Madison, and Tuscaloosa counties but was not encountered during biological surveys of project areas.

BLUE RIDGE CATCHFLY

Environmental Baseline

This species is associated with cliffs, rock barrens, sandstone outcrops and rock houses. This habitat type is available on the Bankhead but will be protected during the project. This plant was not encountered during field surveys.

TERRESTRIAL SENSITIVE SPECIES - Evaluated

This section provides information on the determinations of effects on terrestrial Forest Service listed Sensitive plant and animal species on the Bankhead National Forests.

SMALL-FLOWERED BUCKEYE, BUTTERNUT and BRYSON'S SEDGE

Environmental Baseline

These species are associated with mixed mesic forest habitats. Small-flowered Buckeye is found in rich mesic woods and along creek margins. Butternut is found in rich, mesic hardwoods and streamside margins, especially in calcareous alluvial depositions along the streams. Bryson's sedge is found in rich, mesic deciduous woods, shaded slopes above streams or on bluffs above streams. It is relatively a newly identified plant (1993) and little is known about its life science. It is known from only two locations on the Bankhead National Forest. Neither of these locations are proposed for treatment through this Project. Surveys were conducted on project sites but these species were not found within the treatment areas.

Direct, Indirect and Cumulative Effects

Thinning, site preparation and temporary road construction are not expected to impact these species. Since these species are found in mesic areas, the projects primary thrust of treating loblolly pine stands is not expected to impact any current or potential habitat. Thinning, site preparation by roller drum chopping or construction of temporary roads will not occur within riparian areas where these species are likely to occur.

Mixed mesophytic forests, dry mesic oak forests, and dry and dry-mesic oak-pine forests will provide habitat for these species. Individuals currently existing within the mixed mesophytic forests on the Bankhead will not be affected by this Project, as no actions are proposed within this forest type.

No impact is anticipated to these species.

WHITE-FRINGELESS ORCHID (also evaluated as a candidate species in section III.C.9 of the Biological Assessment)

Environmental Baseline

This species is associated with, but not limited to, low wet woods or areas that commonly fall into streamside management zones. For survival, it requires mesic conditions and at least partial shade. This species is not limited to a particular soil type. The white-fringeless orchid is found in bogs, seepage slopes, spring seeps or swamps. It grows in association with red maple, tulip tree, white oak, sweet bay, black gum, lady fern, royal fern, cinnamon fern, yellowroot and sphagnum moss. These habitats may be found in riparian areas or in the uplands.

Direct, Indirect and Cumulative Effects

Habitat for this plant will be protected during any project activities. Surveys conducted on project areas did not find any of these habitats nor any of this plant species. Riparian areas, seeps, swamps, and bogs are typically not the areas where this project would be conducted. Heavy equipment used for site preparation and thinning activities will not operate within the streamside management zones or wetlands. Areas to be treated have been surveyed and all wetland areas will be identified and protected during treatments.

Individuals currently existing on the Bankhead will not be affected by this Project, as no actions are proposed within the appropriate habitat type. *No impact* is anticipated to this sensitive species.

SWEET PINESAP

Environmental Baseline

Sweet Pinesap is associated with mixed xeric forests. This small saprophytic plant is noted to be found in dry sandy (acidic) woods and in pine and mixed pine/hardwood stands. It is apparently most often found under pines, giving rise to the common name. It has been reported as being saprophytic on pine roots and the bases of pine trees. It has been reported to occur in mixed deciduous hardwood pine stands also. In the south, it occurs in the mountain foothills and piedmont areas. The Nature Conservancy, Alabama Heritage Program has an agreement with the Forest Service to locate and identify individuals of this species on the Bankhead National Forest. Areas with historical records of occurrence have been re-visited to confirm presence or absence through this agreement. Despite past records of occurrence, it has not been located in subsequent field searches.

Direct, Indirect and Cumulative Effects

This species was not encountered during pre-project surveys, which were conducted during a known flowering period. Any species encountered through additional surveys and monitoring will be identified and protected from the direct impacts of equipment during road construction, site preparation or thinning. Small, non-descript and unknown populations may exist within areas to be treated. Proposed treatments such as thinning could potentially have a direct impact upon this species. The indirect effects of thinning a pine stand containing this species is not known. All known populations are outside of the proposed treatment areas of the project proposal. Small numbers of this species could be directly or indirectly impacted by this project.

Dry and Xeric Oak Forests and Woodlands, Xeric Pine-Oak Forests and Woodlands, and Longleaf Pine/Bluestem Woodlands will provide habitat for this species. Alternatives providing for these desired future conditions will have a beneficial cumulative effect on Sweet Pinesap due to restoration of potential habitat. *No impact* is anticipated to this species.

JEWELED TRILLIUM

Environmental Baseline

Jeweled trillium is associated with mixed mesic forests. This species has been encountered within the Bee Branch area of the Bankhead National Forest. The habitat of this plant is described as rich coves under mature trees, in rhododendron thickets along streams, and at forest edges, frequently on outcrops partially exposed by road building. The plant is associated with moist, rich sites. Although some other trillium species were found during field surveys, this species were not found on any site proposed for treatment.

Direct, Indirect and Cumulative Effects

This project and its associated activities is not expected to impact this trillium. This species is found in mesic, rich areas, this project will primarily occur on ridgetops and side slopes that are not current or potential habitat. Site-specific surveys have not found this plant on project areas. Any populations encountered through additional surveys and monitoring will be identified and protected from the direct impacts of equipment during road construction, site preparation or thinning.

Mixed mesophytic forests, dry mesic oak forests, and dry and dry-mesic oak-pine forests will provide habitat for this plant. Individuals which may currently exist within the mixed mesophytic forests on the Bankhead will not be affected by this Project, as no actions are proposed within this forest type. Alternatives providing for these desired future conditions will have a beneficial cumulative effect on Jeweled Trillium due to restoration and/or maintenance of appropriate habitat. *No impact* is anticipated to this species.

CLAMMY LOCUST

Environmental Baseline

This species is associated with Southern Yellow Pine Forests and Woodlands. This tree is reported to have grown in rocky woods in Winston County in the past. Other habitat descriptions include thin woods and open places. It is known to be present in a wildlife opening on Bankhead National Forest, but this opening is not a proposed treatment site.

Direct, Indirect and Cumulative Effects

Beneficial cumulative effects are anticipated due to restoration of potential habitat. Xeric Pine-Oak Forests and Woodlands (Shortleaf Pine/Bluestem) and Longleaf Pine/Bluestem Woodlands will provide suitable habitat for this tree. A *beneficial impact* is anticipated to this species.

RIVERBANK BUSH-HONEYSUCKLE

Environmental Baseline

This species occurs within forest riparian habitats. It has been encountered along streams in the Bankhead National Forest, but was not encountered during field surveys for this Project. Initiative-associated management actions will take place within upland stands and riparian areas will be protected.

Direct, Indirect and Cumulative Effects

There will be no effect on riverbank bush-honeysuckle during this Project. Streamside management zone guidelines will be adhered to. Current acreages of riparian habitat will remain after implementation of this forest health and restoration intiative. *No impact* is anticipated to this species.

GORGE (TAYLOR'S) FILMY FERN

Environmental Baseline

This fern is somewhat to very epipetric in that they are usually found on more or less vertical rock faces. Gorge filmy fern grows on moist bluff faces. These sites will be protected during project activity. Surveys performed on project areas did not indicate the presence of this species.

Direct, Indirect and Cumulative Effects

Rock outcrops and cliff habitats will be protected during this Project and no impact to associated species will occur. *No impact* is anticipated to this species.

ALABAMA GLADECRESS & FLESHY-FRUIT GLADECRESS (Fleshy-fruit gladecress considered as a candidate species within section III. C.3 of the Biological Assessment)

Environmental Baseline

These species are associated with glades, prairies, and woodland habitats. Alabama gladecress is found on limestone glades and Fleshy-fruit gladecress occurs on calcareous cedar glades. Potential habitat for these species does exist within BNF, but was not encountered during surveys within the proposed treatment stands. Alabama gladecress has been encountered in Franklin and Lawrence counties. Fleshy-fruit gladecress is known from Marshall county, Alabama.

Direct, Indirect and Cumulative Effects

No impact on these species is anticipated, as the project will not impact glades, where these species are found. .

NEVIUS' STONECROP

Environmental Baseline

This species is somewhat to very epipetric in that they are usually found on more or less vertical rock faces. Stonecrop is most likely on rock faces above creeks on limestone or shale, and on limestone outcrops in woodlands growing amongst various mosses under light to heavy shade. No plants were observed during field surveys.

Direct, Indirect and Cumulative Effects

No effect on this species is anticipated. None of the areas proposed treatments include rock cliffs, outcrops or bluffs. Steep bluffs are present within a very few treatment stands. These sites will be identified and protected during implementation phase of the project.

No impact is anticipated to this species.

YELLOW FRINGELESS ORCHID

Environmental Baseline

This species is known to occur in bogs in Winston County. This plant and its habitat were not encountered during the field surveys conducted as a part of this evaluation.

Direct, Indirect and Cumulative Effects

The proposed treatment stands do not contain any bogs. The project will not create nor eliminate any bog habitat. No impact is anticipated to this species.

MENGE'S FAMEFLOWER and LIMESTONE FAMEFLOWER, ALABAMA SKULLCAP

Environmental Baseline

These species are associated with cedar glades, limestone or sandstone outcrops, sandstone cliffs or rocks. Menge's fameflower is found in soil pools within expanses of flat sandstone outcrops that are large enough to allow full sunlight or near full sunlight on the outcrop. It is known to occur on the Bankhead National Forest. The limestone fameflower also occurs on the district The Alabama Skullcap is often associated with moist glades in oak-pine flats.

Direct, Indirect and Cumulative Effects

Glades and rock outcrops were encountered on several locations during field surveys. On some of these sites, individual Fameflowers (Menges and Limestone) were encountered during field surveys. These areas have been identified within the proposed treatment areas for thinning, site preparation or temporary road construction for this proposal. These glades will be identified during project activity planning and will be protected throughout the project. This forest health and restoration project will have no direct effect on these species. In some cases the thinning effect on surrounding trees will result in beneficial indirect effects to these glade species. The cumulative effect of this project will ultimately be beneficial for these species when found in close association with thinning operations. Any practice that encourages opening of the canopy and reduction of overstory will ultimately benefit these plants long term survival. There will be no direct effect from the project.

The project will have *no impact* to this species, as all sites to be treated have been surveyed and areas that were identified as having a presence of these plants will be protected during the planning and implementation phases of the project.

LITTLE MOUNTAIN MEADOW RUE

Environmental Baseline

Little mountain meadow rue is associated with rock outcrop and cliff habitats. This species is somewhat to very epipetric in that they are usually found on more or less vertical rock faces. Little mountain meadow rue is found under wet ledges.

Direct, Indirect and Cumulative Effects

No plants were observed during field surveys although several rock bluffs with potential habitat were located within or adjacent to project areas. This species only grows in a wet rock habitat. Practices associated with this project will not occur within the direct area of this habitat. The project will not create nor eliminate potential habitat for this species, as all rock outcrops and cliffs will be identified and protected during project operations. *No impact* is anticipated to this species.

LANCELEAF TRILLIUM

Environmental Baseline

This species prefers alluvial soils and thrives on floodplains, although it has been observed growing in rocky upland woodlands and brushy thickets.

Direct, Indirect and Cumulative Effects

Although this species was not encountered during field surveys conducted as a part of this Project, potential habitat is present within the project area. Thinning, site preparation and the construction of temporary roads could directly impact individuals if they were present. Other species of trilliums were encountered during field surveys but not this one. *No impact* is anticipated to this species.

BROADLEAF BARBARA'S BUTTONS

Environmental Baseline

This species habitat is described as pinelands and damp woods.

Direct, Indirect and Cumulative Effects

There are no records of this plant being found on Bankhead National Forest. Although this species was not encountered during field surveys conducted as a part of this project, potential habitat is present within the project area. Thinning, site preparation and the construction of temporary roads could directly impact individuals if they were present.

Any species encountered through additional surveys and monitoring will be identified and protected from the direct impacts of equipment during road construction, site preparation or thinning. Proposed treatments such as thinning could potentially have a direct impact upon this species. Small numbers of this species, if present, could be directly or indirectly impacted by this project. The project *may impact* this species however any impact would likely be to randomly occurring, isolated plants and will *not cause a trend to federal listing or a loss of viability*.

PINNATE-LOBED BLACK-EYED SUSAN

Environmental Baseline

This species habitat is described as riparian areas associated with rock outcrops and cliffs.

Direct, Indirect and Cumulative Effects

This species was not encountered during field surveys conducted as a part of this Project. Thinning, site preparation and the construction of temporary roads could directly impact individuals if they were present. Riparian areas associated with rock outcrop and cliff habitats are generally outside of the project area. It is not anticipated that these habitats will not be within the project treatment areas as they were not located during field surveys. *No impact* is anticipated to this species.

DIANA FRITILLARY

Environmental Baseline

This butterfly is described as a woodland species that is associated with stream habitat. Forest Service records do not indicate this species presence on the BNF, but potential habitat is present.

Direct, Indirect and Cumulative Effects

Streamside management guidelines and riparian area protections will mitigate the potential for any impacts on this butterfly's habitat. *No impact* is anticipated to this species.

RAFINESQUE'S BIG-EARED BAT

Environmental Baseline

This mammal uses abandoned buildings and large hollow trees as sites for nursery colonies. According to E. D. Pierson, this species may form roosts under loose sloughing bark of dead and dying trees, in addition to roosts formed in tree cavities (1998). It hibernates in old mines, caves, cisterns and wells in the northern part of its range. According to Best et al., this species usually is not found hibernating in caves in the southern part of its range (1999). This species is often encountered using bridges. The range of this species approximates the historical range of the great cypress swamps, indicating that it may have relied on these sites for roosting and foraging (Bat Conservation International 2001).

Bankhead wildlife staff and cooperators monitor bat populations on the BNF through bat mist netting, harp trapping and surveys of caves and bridges. Rafinesque's big-eared bat has not yet been captured or observed on the Bankhead National Forest, but potential habitat is available.

Direct, Indirect and Cumulative Effects

Thinning of existing pine stands will increase use of these areas by bats in general. Opening up the stands will allow for through flight and foraging. Restoration of southern pine beetle spots will benefit bats by providing foraging areas. Drum chopping prior to restoration should not effect Rafinesque's big-eared bat, as it is not known to use the forest floor as do some other forest bat species. Prescribed burning may create snags, a positive benefit to Rafinesque's big-eared bat. Cool season burning should not harm maternity roosts within forest stands. Providing native forest communities over the landscape; protecting caves; monitoring abandoned buildings and bridges; and maintaining stream health will result in positive cumulative benefits to the big-eared bat if it is present on the BNF. *No impact* is anticipated to this species.

AQUATIC SENSITIVE SPECIES

This section provides information on the determinations of effects on aquatic Forest Service listed Sensitive plant and animal species on the National Forests in Alabama. Other listed species are not discussed due to lack of presence in the geographical area, unsuitable habitat conditions, and/or lack a "high probability of occurrence" on National Forest Lands. Species that are not known from the Bankhead have been excluded from review.

All aquatic habitats will be protected during the implementation of the Forest Health and Restoration Project and will not be directly impacted. Protection mechanisms are in place that will mitigate any negative effects that might be indirect. These mechanisms are presented in the *Mitigation Measures Common to All Alternatives* in Chapter 2 of the Environmental Impact Statement .

CADDISFLIES

Environmental Baseline

Two sensitive species of caddisflies may be found in the BNF. *Hydroptila paralatosa* is found in small streams of the fall line and has been collected in Winston County. *Rhyacophila carolae* has been collected in a small tributary of Bee Branch in the BNF. Caddisflies are confined to water during the majority of their life cycle. Adults of most species are inactive during the day and active during the evening (Harris et al.,1991).

Direct, Indirect and Cumulative Effects

No direct impact from the project is anticipated, as these are aquatic species. However, streamside management zone guidelines will be followed for on every tract. In these instances, heavy equipment will not be utilized within close proximity to streams. Thus, direct physical damage would be prevented. Indirect effects will be avoided by utilization of erosion control efforts where indicated to prevent, reduce or control erosion. Cumulative effects would be minimized if all existing guidelines for the streamside management zone are observed and erosion control is utilized on upland sites.

No impact is anticipated to these species.

DARTERS

Environmental Baseline

Tuskaloosa darter is found in streams with moderate to swift flow. It will be found in cobble, gravel and slab riffles. It has been collected in Sipsey Fork, Borden Creek, Rush Creek and Capsey Creek in the Bankhead. This species was not collected during Biomonitoring in the Upper Mulberry Fork Watershed, 1999-2001 conducted by Geological Survey of Alabama.

The warrior darter is found in small to medium streams with moderate flow. This species will be found in rubble, bedrock, and gravel-filled pools. This species feeds on aquatic insect larvae. Warrior darter has been collected in the following creeks on Bankhead National Forest; Thompson, Borden and Sipsey Fork.

Preferred habitat for the goldstripe darter is described as small sluggish streams, spring seepage areas, and small woodland tributaries, which are adjacent to larger streams. Favored microhabitats include patches of woody debris, leaf material, mud, silt and sand. Records do not indicate that this species has been collected on Bankhead National Forest.

Rush darter has been collected in the Clear Creek system in Bankhead National Forest. Collection sites are characterized as relatively low gradient, small streams with sand substrate and burrweed beds.

Tuscumbia darter is found in limestone spring ponds and runs with aquatic vegetation present. This species is especially sensitive to changes in physical habitat, such as temperature or turbidity. The longhead darter has been collected within the Bankhead National Forest in the Sipsey Fork.

Direct, Indirect and Cumulative Effects

No impact is anticipated on these aquatic species. Streamside management zone guidelines will be followed on every tract. Thus, direct physical damage and downstream effects would be prevented. Erosion control efforts will be utilized where indicated by Forest Service personnel to prevent, reduce or control erosion.

ALABAMA SPIKE, PUPPLE PIGTOE, RIDGED MAPLELEAF, SOUTHERN CREEKMUSSEL, SOUTHERN HICKORYNUT, ALABAMA HICKORYNUT, ALABAMA RAINBOW and ALABAMA HEELSPLITTER

Environmental Baseline

Potential habitat for these aquatic species exists on Bankhead National Forest. All of these mussel species require habitat stability, including substrate and water quality. These species are sensitive to water quality degradation; sedimentation being an important factor. Ground disturbing activities within a watershed are potential sediment sources.

Several of these species have been collected in the northern portion of the district, including the Alabama Spike, Southern Creekmussel and the Alabama Rainbow (McGregor, 1992). The Alabama heelsplitter is found in large rivers and is known from the Cahaba River, downstream of Oakmulgee Ranger District. Although it has been recorded in Blount and Jefferson counties, it has not been collected in the Bankhead National Forest.

Direct, Indirect and Cumulative Effect

N*o impact* is anticipated on these aquatic species. Streamside management zone guidelines will be followed on every tract to mitigate potential sedimentation. Direct physical damage to individuals and habitat (substrate) will also be prevented through implementation of streamside management zones and riparian area identification. Erosion control efforts will be utilized by FS personnel to prevent, reduce or control erosion on upland sites as an additional mitigation measure.

LIVERWORTS

Environmental Baseline

These species are somewhat to very rock loving in that they are usually found on more or less vertical rock faces in moist conditions. Liverworts are moss-like, non-vascular plants that grow on damp ground, rocks and tree trunks. There are six species of liverworts, listed as sensitive, that may occur in the Bankhead National Forest. *Cheilolejeunea evansii* is known to occur on the bark of hardwood trees in humid gorges in North Carolina. In Alabama, this species is reported to be found associated with hemlocks and riparian areas. *Plagiochila echinata* is also found occurring on rocks and stream banks in humid gorges and in the spray zone of waterfalls in North Carolina. *Aneura maxima*, *Pellia appalachia*, *Raudula sullivantii*, *Riccardia jugata* are other species that have been found in similar habitats.

Direct, Indirect and Cumulative Effects

No direct impact on these species is expected, as the proposed activities will not occur within the appropriate type of habitat. The proposed activity may occur in close proximity to these species, but there is no opportunity for indirect impact to the moist, rock habitats where they are found. None of these species were found during field reviews of treatment sites.

No impact is anticipated for these species.

JAMESIANTHUS

Environmental Baseline

This species is associated with, but not limited to, low wet woods or areas commonly considered as streamside management zones. It needs mesic conditions and at least partial shade to survive. Jamesianthus is found in silty sand or gravelly margins of streams, especially where streams cut through limestone, in full or partial sun.

Direct, Indirect and Cumulative Effects

N*o direct impact* is anticipated on this aquatic species. Streamside management zone guidelines will be followed on every tract to mitigate potential sedimentation. Direct physical damage to individuals and habitat (substrate) will also be prevented through implementation of streamside management zones and riparian area identification. Erosion control efforts will be utilized by FS personnel to prevent, reduce or control erosion on upland sites as an additional mitigation measure to prevent indirect impacts. *No impact* is anticipated.

BLACK WARRIOR WATERDOG (this species was evaluated as a candidate for federal listing in section III.B.2.)

Environmental Baseline

This relatively large salamander is found primarily in the Sipsey Fork of the Bankhead National Forest. Its population is apparently restricted to 7 counties within north central Alabama. On the Bankhead National Forest it uses habitat almost identical to that of the flattened musk turtle. This species generally requires clear streams with rocky outcroppings and pools 3 to 5 feet in depth. Surveys for this species were conducted during the 1990's and it was apparently confined to the Sipsey Fork. See the evaluation for this species in section III.B.2.

The determination is *may impact individuals, but not likely to cause a trend to federal listing or a loss of viability.*

<u>Explanation of Determinations for Sensitive Species</u>

Possible Determinations and the Needed Follow-up Actions – The four possible determinations of effects are:

1. "no impact",
2. "beneficial impact",
3. "may impact individuals, but not likely to cause a trend to federal listing or loss of viability",
4. "likely to result in a trend to federal listing or a loss of viability".

All the possible effects of a proposed action should be included under one of the above determinations. There is no need to consult with the FWS for sensitive species. No action, other than documenting the rationale, is required for determination of "no impact", "beneficial impact" or "may impact individuals, but not likely to cause a trend to federal listing or a loss of viability". If the determination is "likely to result in a trend to federal listing or a loss of viability", the proposed action should be modified to avoid, minimize or rectify the impact. Sensitive species must receive special management emphasis to ensure their viability and to preclude the need for federal listing.

Determination of Effects for Sensitive Species

The proposed activity will have no impact on Rafinesque's big-eared bat, 27 species of plants, the aquatic habitats of mussels, darters, caddisflies, and the Black Warrior waterdog, which are listed Sensitive Species as per the Regional Forester's List, revised January, 2002. For Sweet Pinesap and Broadleaf Barbara's Buttons, the project may impact individuals, but is not likely to cause a trend to federal listing or loss of viability. The project is considered to be beneficial for Clammy Locust. Forest Service is not required to consult or otherwise review potential impacts to sensitive species with FWS. Three species which are contained within the "Sensitive" listing are also being consider for listing with the Fish and Wildlife Service, thus are considered as "Candidate" species including the Black Warrior waterdog, white fringeless orchid, and the fleshy-fruit gladecress. While they are noted within the sensitive species section, an evaluation is conducted within the BA.

Table BE.C - Determination of Effects Table - Terrestrial Sensitive Species

Common Name	**Scientific Name**	**Effect**	**Mitigation Measure**
Small flowered buckeye	*Aesculus parviflora*	No Impact	Avoidance
Tennessee Milkvetch	*Astragalus tennesseensis*	No Impact	Avoidance
Spreading yellow false foxglove	*Aureolaria patula*	No Impact	Avoidance
Bryson's sedge	*Carex brysonii*	No Impact	Avoidance
Alabama larkspur	*Delphinium alabamicum*	No Impact	Avoidance
Riverbank bush-honeysuckle	*Diervilla rivularis*	No Impact	Avoidance
Gorge filmy fern	*Hymenophyllum tayloriae*	No Impact	Avoidance
Butternut	*Juglans cinerea*	No Impact	Avoidance
Alabama Gladecress	*Leavenworthia alabamica v. ala*	No Impact	Avoidance
Fleshy-fruit Gladecress	*Leavenworthia crassa*	No Impact	Avoidance
Duck River Bladderpod	*Lesquerella densipila*	No Impact	Avoidance

Common Name	**Scientific Name**	**Effect**	**Mitigation Measure**
Sweet pinesap	*Monotropsis odorata*	May Impact 1/	
Nevius' stonecrop	*Sedum nevii*	No Impact	Avoidance
White fringeless orchid	*Platanthera integrilabia*	No Impact	Avoidance
Yellow fringeless orchid	*Platanthera integra*	No Impact	Avoidance
Alabama snow-wreath	*Neviusia alabamensis*	No Impact	Avoidance
Alabama skullcap	*Scutellaria alabamensis*	No Impact	Avoidance
Blue Ridge catchfly	*Silene ovata*	No Impact	Avoidance
Jeweled Trillium	*Trillium simile*	No Impact	Avoidance
Menge's fameflower	*Talinum mengesii*	No Impact	Avoidance
Little mountain meadow rue	*Thalictrum mirabile*	No Impact	Avoidance
Clammy Locust	*Robina viscose*	Beneficial Impact	
Limestone Fameflower	*Talinum calcaricum*	No Impact	Avoidance
Lanceleaf Trillium	*Trillium lancifolium*	No Impact	Avoidance
Broadleaf Barbara's Buttons	*Marshallia trinervia*	May Impact 1/	
Diana Fritillary	*Speyeria diana*	No Impact	Avoidance
Rafinesque's Big-eared Bat	*Corynorhinus rafinesquii*	No Impact	Avoidance
Scott's Spleenwort	*Asplenium x ebenoides*	No Impact	Avoidance
Pinnate-lobed Black-eyed Susan	*Rudbeckia triloba var pinnatiloba*	No Impact	Avoidance

1/ May impact Individuals but not likely to cause a trend to federal listing or a loss of viability

Evaluation of locally rare species.

Table BE.D - Locally Rare Species List - Terrestrial Species

Common Name	*Scientific Name*	Ranking	Habitat
Green Salamander	*Aneides aeneus*	S3G3G4	7
Seepage Salamander	*Desmognathus aeneus*	S2G3G4	21
Three-corner prairie clover	*Dalea carnea var gracilis*	G5T3	6
Gattinger's prairie clover	*Dalea gattingeri*	G3G4	6
A prairie clover	*Dalea sp.*	G2	6
Little-leaved alumroot	*Huechera parviflora var puberula*	S3G4T3	18
Small-head gayfeather	*Liatris microcephala*	S1G3G4	19
Ginseng	*Panax quinquefolia*	S1G3G4	18
Weft fern	*Trichomanes intricatum*	G3G4	7
Blue ridge trillium	*Trillium stamineum*	G3G5	18
Wahoo	*Euonymus atropurpurea*	S1G5	18
Large whorled pogonia	*Isotria verticillata*	G5	10
Rock clubmoss	*Huperzia porophilla*	S1G4	7
Round leaved firepink	*Silene rotundifolia*	S1S2G4	7
Dwarf bristle fern	*Trichomanes petersii*	S2G4G5	7
Wild hyacinth	*Camassia scilloides*	G4G5	6
Sunnybells	*Schoenolirion croceum*	S2G4	6
Puttyroot	*Aplectrum hyemale*	S2G5	18
Dutchman's breeches	*Dicentra cucullaria*	S2G5	18
Columbo	*Swertia caroliniensis*	G5	18
Prairie Trillium	*Trillium recurvatum*	S2G5	18
Goldie's fern	*Dryopteris goldiana*	S1G4	18

Common Name	***Scientific Name***	**Ranking**	**Habitat**
Silky Camellia	*Stewartia malacodendron*	S2S3G4	18
Mountain Camellia	*Stewartia ovata*	S2S3G4	11
Alabama Grapefern	*Botrychium jenmanii*	G3G4 SH	8
Winter Grapefern	*Botrychium lunarioides*	G4 SH	12
White Trout Lily	*Erythronium albidum*	G5 S1S2	18
Yellow Trout Lily	*Erythronium umbilicatum ssp umbilicatum*	G5T5 S1	18
Twinleaf	*Jeffersonia diphylla*	G5S2	18
Pinesap	*Monotropa hypopithys*	G5S2	18
Allegheny Spurge	*Pachysandra procumbens*	G4G5 S2S3	18
Wherry's Catchfly	*Silene caroliniana spp wherryi*	S1S2	19
Bent Trillium	*Trillium flexipes*	S2G5	18
Toadshade Trillium	*Trillium sessile*	S2G4G5	18
Pink lady's slippers	*Cypripedium acaule*	S3G5	12
Yellow lady's slippers	*Cypripedium pubescens*	G5	18
Grass-of-Parnassus	*Parnassia asarifolia*	G4	11
Goldenseal	*Hydrastis Canadensis*		18
Royal Catchfly	*Silene regia*	S2G3	6
Nestronia	*Nestronia umbellula*	S2G4	19

Key to Table - Habitat Associations

1= Cave Habitats
2= Wetland (Bog) Habitats
6= Glades, Prairies & Woodland Habitats
7= Rock Outcrop and Cliff Habitats
8= Grass/Forb Habitats
10= Mid to Late Successional Deciduous Forest Habitats
11= Forest Riparian Habitats
12= Habitat Generalist

11= Forest Riparian Habitats
12= Habitat Generalist
13= Area Sensitive Mid-&Late-Successional Deciduous Forest Habitats
17= Southern Yellow Pine Forests & Woodland
18= Mixed Mesic Forest Habitats
19= Mixed Xeric Forest Habitats
20=Shrub/Seedling/Sapling Habitats
21=Seeps and Springs

A list of aquatic Forest Service Locally Rare species known, or suspected, to occur, on or near the Bankhead National Forest follows:

Table BE.E - Forest Service Locally Rare Species List - Aquatic Species

Species	Status
Bandfin darter *Etheostoma zonistium*	S1G3G4
Flame chub *Hemitremea flammea*	S3G4
Delicate spike *Elliptio arctat*	S2G4Q
Alligator Snapping Turtle *Macroclemys temminckii*	RS3G3G4
Blueface darter *Etheostoma sp cf. zonistium*	Locally Rare

Some species are of concern although not listed as threatened or endangered by the FWS. They have been ranked Globally as G1, G2 or G3 by the Natural Heritage Network of The Nature Conservancy, which means viability concerns throughout their entire range. This may be due to habitat requirements, range limits or particular vulnerability to activities. These species have been listed by the Regional Forester as Sensitive and require special consideration in order to ensure that viability is not impaired and to preclude any trend toward the necessity of their being proposed for listing as threatened or endangered by the FWS. According to the Natural Heritage Network rankings, G1 species are critically imperiled globally because of extreme rarity (typically less than 6 occurrences, less than 1,000 individuals or very few remaining acres) or because of some factor(s) making them especially vulnerable to extinction. Species ranked G2 are imperiled globally because of extreme rarity (typically 6-20 occurrences, 1,000 to 3,000 individuals or few remaining acres) or because of some factor(s) making them very vulnerable to extinction. Species ranked as G3 are rare or uncommon (typically 21-100 occurrences or 3,000 to 10,000 individuals) throughout its range; or found locally, even abundantly, in a restricted range (e.g. in a single state or physiographic region); or vulnerable to extinction throughout its range because of specific factors. Rankings begin with a T instead of a G are used for subspecies and two rankings together, such as G2G3, indicates uncertainty in the ranking of that species. A question mark (?) indicates some doubt concerning the status of the species or subspecies. Rankings preceded by an S indicate the status inside the state of Alabama as determined by the Alabama Natural Heritage Program. The list of plant and animal species is based upon the Southern Region Sensitive Species.

LOCALLY RARE SPECIES

GREEN SALAMANDER AND SEEPAGE SALAMANDER

Seepage salamanders are found within damp, but not wet leaf beds and root masses on the forest floor near springs, seeps, streams and rock houses. This species is found in shaded, moist deciduous or semi-deciduous ravines. Green salamanders are found within damp, but not wet, crevices in shaded rock (sandstone) outcrops, bluffs and ledges. This species is also found in hardwood coves under the bark and in cracks of rotting trees, and stumps. It may be found in pine uplands, particularly Virginia pine and white-pine hemlock with mountain laurel in the understory.

Neither of these species were encountered during field surveys. They are not expected to occur in the project areas, as appropriate habitat is not available. Suitable habitat will not be affected by this project.

THREE-CORNER PRAIRIE CLOVER, GATTINGER'S PRAIRIE CLOVER AND A PRAIRIE CLOVER

These species are known to occur in glades. None of them are known from the Bankhead National Forest, although potential habitat does exist. One species, *Dalea* sp., is known to exist approximately one mile north of the Bankhead National Forest.

No glades or glades associates will be impacted by this proposed project.

LITTLE-LEAVED ALUMROOT

This species occurs in mesic hardwood coves and in riparian areas.

No impact to this species is expected from this project. It was encountered at one location during the field surveys. This area has been identified within the proposed treatment areas for thinning, site preparation or temporary road construction for this proposal. This area will be identified during project activity planning and will be protected throughout the project. This forest health and restoration project will have no direct effect on this species. And, riparian areas will be protected through the established guidelines for streamside management zones.

SMALL-HEAD GAYFEATHER

This species is found on sandstone and in dry barrens. It is also described as occurring in old fields, meadows and clearings.

This species was encountered on one field survey of a project area. This was the first instance known to Forest Service personnel that it has been recorded from Bankhead National Forest. This area has been identified within the proposed treatment area for thinning, site preparation or temporary road construction for this proposal. This area will be identified during project activity planning and will be protected throughout the project. This forest health and restoration project will have no direct effect on this species.

WEFT FERN

This fern is found in rock houses and spray cliffs. Neither this species nor the appropriate habitat was encountered during field surveys. This species has not been recorded in the Bankhead National Forest. Suitable habitat will not be effected by this project.

WAHOO, GOLDENSEAL, PUTTYROOT, DUTCHMAN'S BREECHES,

BLUE RIDGE TRILLIUM, PRAIRIE TRILLIUM, COLUMBO AND GINSENG

These plants are found primarily on, but not limited to, limestone-derived soils, heavy clay-like soils associated with floodplain woods or calcareous mesic woods. Wahoo occurs along stream banks and in rich mesic woods. Goldenseal is found in mostly mature deciduous woodlands, usually in rich soils over limestone. Puttyroot is found in heavy soils of floodplains and low rich woods. Dutchman's breeches is found in rich woods, north facing slopes and stream banks. Blue ridge trillium is found in rich mesic woods, occurring on heavy clays in the floodplains of small streams. It is often found in association with red buckeye. Prairie trillium is found in rich mesic woods on slopes, along streams and in floodplains, often associated with mixed or loamy/clay soils. Columbo is found in rich woods on cool slopes in mesic areas or open woodlands. Ginseng is found on rich mesic slopes, alluvial deposits, and in hardwood coves.

Puttyroot was found on one project area during field surveys. This area has been identified within the proposed treatment area. These sites will be identified during project activity planning and will be protected throughout the project. This forest health and restoration project will have no direct effect on this species.

The Blue Ridge trillium was encountered at several locations during field surveys for this project. These areas have been identified within the proposed treatment areas for thinning, site preparation or temporary road construction. These areas will be identified during project activity planning and will be protected throughout the project. This forest health and restoration project will have no direct effect on this plant species. No individual plants of these species should be impacted by this project.

Ginseng was also located on at least two sites during field surveys. These areas have been identified within the proposed treatment areas for thinning, site preparation or temporary road construction. These sites will be identified during project activity planning and will be protected throughout the project. This forest health and restoration project will have no direct effect on this species.

WHERRY'S CATCHFLY and ROYAL CATCHFLY

Wherry's catchfly is found in sandy, rocky upland woods with calcareous soils. The royal catchfly is also known from dry woods, prairies and rocky openings in well-drained calcareous or cherty soils. Neither of these species was encountered during field surveys. Potential habitat is available within the proposed project area, but should not be negatively impacted.

PINK LADIES SLIPPER

This species is most often associated with mesic woods habitat. Only a few sightings of Pink Ladies Slipper are recorded on Bankhead. It is not known to occur within the proposed tracts.

No negative impact is expected for this species as the project should avoid its habitat.

YELLOW LADY'S SLIPPER

This species is found in bogs, swamps, and woodlands. Individuals have been recorded in the Bankhead National Forest, although none were encountered in the project area. These areas will be avoided by this project and protected by streamside management zones.

GRASS-OF-PARNASSUS

This plant is found in bogs and springs and on wet slopes. This species was not encountered during field surveys and appropriate habitat will not be impacted by the project.

LARGE WHORLED POGONIA

This plant is found in acid woods, both moist and dry. It is also found along stream margins. This plant was encountered during field surveys on one site. This site has been identified within the proposed treatment area. This area will be identified during project activity planning and will be protected throughout the project. This forest health and restoration project will have no direct effect on this plant.

NESTRONIA

This species is most often associated with mesic woods and rocky dry woods habitat. It can occur in pine stands on dry sites, and most often occur in the dry xeric upland oak/hickory/shortleaf pine overstory community types. There are numerous colonies of Nestronia on the Bankhead National Forest and this particular plant has shown vigorous resprouting and vegetative growth after disturbance from fire and some logging operations. It is a nondescript plant and sometimes found in small, isolated groups.

This plant was encountered during the field surveys for this project. The sites on which this plant was identified will be identified during project planning activity. Practices will be planned with full consideration of its presence and viability. Any practice that is considered to be detrimental to the long term survival of this plant will be avoided.

There is potential that small, individual populations of this plant may be impacted by this project but it would not lead toward a federal listing of the species or result in a loss of viability for the species.

ROCK CLUBMOSS, ROUNDLEAVED FIREPINK AND DWARF BRISTLE FERN

These plants are associated with sandstone outcrops or cliffs. The clubmoss is found in shaded crevices, cliffs and ledges of sandstone. The firepink is found in crevices of dry sandstone cliffs and ledges, at or near the bluff line, in full to nearly full sun. The bristle fern is found on shaded moist rocks (epipetric) of sandstone cliffs and overhanging ledges, and large shaded boulders and sometimes on the bases of tree trunks.

There will be no impact to these species, as the proposed project will not impact these habitats.

WILD HYACINTH AND SUNNYBELLS

Sunnybells are most often associated with well-drained, sandy soils, and with pinelands or cedar glades. There is usually a surface to subsurface water flow in connection with these sites, although it may only be seasonal. The hyacinth is associated with cedar glade woodlands, and also with low-lying calcareous alluvial deposit first terrace riparian micro-sites.

There will be no damage to individual plants, as the proposed project will not impact these habitats.

SILKY AND MOUNTAIN CAMELLIAS

These are understory shrub species. These two camellias are very similar in appearance. The mountain camellia, is found in moist rich soils along stream margins. The silky camellia is found in moist rich woods. Both species were found during field surveys of the some proposed treatment areas. They were primarily located within the stream side management zones of the treatment compartment although in some cases they were found in other areas. They will not be impacted by the project, as streamside management guidelines are in place and the proposed project should not occur within these areas.

These areas have been identified within the proposed treatment areas for thinning, site preparation or temporary road construction. These areas will be identified during project activity planning and will be protected throughout the project. This forest health and restoration project will have no direct effect on this plant species. No individual plants of these species should be impacted by this project.

GOLDIE’S WOOD FERN

Goldie’s wood fern is a terrestrial species, found in damp woods and on stream banks. It is often found growing among rocks and it is occasionally epipetric at the base of cliffs. It is not expected to be found in the Bankhead National Forest. These habitats are not expected to be impacted by the proposed project.

ALABAMA GRAPEFERN and WINTER GRAPEFERN

Alabama grapefern is found on wooded slopes with loamy, subacid soil and in old fields. In Tennessee, it has been encountered in wet pinelands, ravines and dry hillsides underneath pines. The winter grapefern's habitat is described as sandy slopes of dry, open woods with subacid soil and in old fields. Potential habitat for these two species exists in BNF. Neither species has been recorded from Bankhead, nor were they encountered during field surveys. While individuals may be impacted by this project, there should be no loss of populations that would result in a trend toward federal listing.

WHITE TROUT LILY and YELLOW TROUT LILY

The white trout lily is very rare in Alabama. According to Dean et. al, it is only known from one limestone hillside in the Tennessee Valley and from Cullman County. It has not been encountered in Bankhead National Forest.

The yellow trout lily is found in alluvial woods and rich, moist deciduous woodlands, coves, ravines and along streambanks. The more common trout lily, *Erythronium rostratum*, is frequently encountered in the Bankhead National Forest. No negative impact is expected for populations of these species.

TWINLEAF

Habitat for this species is described as rich, damp, open woods. This species was not encountered during field surveys. No negative impact is expected for this species as the habitat for the species should not be within proposed treatment areas.

PINESAP

This species may be found in upland, moist woods. It was not encountered during field surveys for this project. Potential habitat is present within the proposed project area, but should not be impacted by the project.

ALLEGHENY SPURGE

This species is found in mesic hardwood forests over limestone. It is known to occur within Bankhead National Forest, but was not encountered during field surveys for the proposed project. Appropriate habitat was not encountered within the project area. This species will not be impacted.

BENT TRILLIUM and TOADSHADE TRILLIUM

Bent trillium is known to occur on rich wooded slopes, over limestone-derived soils, in stream valleys, on upper alluvial plains, and in rich woods on higher floodplains. Toadshade trillium is also found in rich woodlands, over limestone and calcareous soils, in floodplains, and on riverbanks. This species has also been encountered in high, dry limestone woods.

Both of these species occur on Bankhead National Forest. Neither was encountered during field surveys for the proposed project. This species will not be impacted by this project.

Aquatic Locally Rare:

ALLIGATOR SNAPPING TURTLE

Alligator snapping turtles are associated with deep rivers and canals primarily, but may be found in lakes and swamps that are located in close proximity to deep water. This is an aquatic turtle, which emerges for nesting purposes. This species requires fish and mollusk populations for feeding and undeveloped areas for nesting.

Alteration of large river systems is detrimental to this turtle. This project will not affect the habitat of this species. No turtles were encountered during the field surveys.

BANDFIN DARTER AND FLAME CHUB AND UNDESCRIBED BLUEFACE DARTER

The Bandfin darter and Flame chub are both common species in the lower Tennessee drainage; the darter in Kentucky, Mississippi, Tennessee and northwest Alabama, including Bear Creek on the BNF and the chub in Tennessee and north Alabama. The darter, however, has only one known population in the Mobile drainage. It is found in Hubbard Creek and its tributaries above Kinlock Falls on the BNF. The species has been collected in Hubbard, Basin, Whitman and Maxwell Creeks. Dycus and Howell (1974) suggested that the species entered the Hubbard Creek drainage by stream capture or some other method from nearby Bear Creek in the Tennessee drainage. Kinlock Falls and competition from other fish may have hindered its distribution out of Hubbard Creek. The Bandfin darter in the Tennessee drainage inhabits coastal plain streams with low gradients and fine gravel to sandy substrates. In the Mobile drainage, the species inhabits cool streams with abundant areas of boulder and bedrock substrates. This darter is common throughout most of its range, but it was listed as a Locally Rare Species because it has such a limited distribution in the Mobile drainage. The flame chub is found in springs and small spring fed streams in the Tennessee River drainage. On the Bankhead NF it is known from tributaries of Flint Creek. The undescribed blueface darter is known from the Black Warrior and Tennessee drainages. At this time, the habitat has not been described.

N*o impact* is anticipated on these aquatic species. Streamside management zone guidelines will be followed on every tract to mitigate potential sedimentation. Direct physical damage to individuals and habitat (substrate) will also be prevented through implementation of streamside management zones and riparian area identification. Erosion control efforts will be utilized by FS personnel to prevent, reduce or control erosion on upland sites as an additional mitigation measure.

DELICATE SPIKE AND ALABAMA HEELSPLITTER

The Delicate spike is found in small to medium headwater streams. It has been recorded in Blount, Cherokee, DeKalb, Jefferson, Macon, and Tuscaloosa counties. It has not been collected in the Bankhead National Forest. The Alabama heelsplitter is found in large rivers and is known from the Cahaba River, downstream of Oakmulgee. It has been recorded in Blount and Jefferson counties. It has not been collected in the Bankhead National Forest.

Mussel species will not be impacted by this project, as appropriate guidelines are in place regarding streamside management zones. Additionally, neither of these species is expected to occur in the project area.

Mitigation Measures

Measures to mitigate any potential damage to habitat of threatened, endangered, sensitive or locally rare species of plants or animals include active and passive ones. Biological staff was involved in all aspects of project planning. All sites have streamside management zones and the related protection guidelines in place, thus no indirect or cumulative effects are anticipated downstream. Any temporary road that has significant potential for producing soil erosion will be rehabilitated with appropriate erosion control measures as have been fully explained within the body of the biological assessment or the mitigation measures as identified within the body of this report.

All areas where locally rare species were found during the field surveys have been identified within the proposed treatment areas. These areas will be identified during project activity planning phase and will be protected as needed to protect the species throughout the project. This forest health and restoration project will have no direct effect on these plant species. No individual plants of these species should be impacted by this project.

Determination of effects for locally rare species

The activity is not expected to have an impact upon locally rare species. While some individual plants within the proposed project areas may be affected, these impacts to individuals or parts of a population will probably not lead to any trend toward federal listing or loss of viability.

This Biological Evaluation was prepared by the Wildlife Staff at Bankhead National Forest. Significant contribution to this included assistance from Michail A. Crump, Hydrologist trainee and Allison Cochran, Biological Science Technician at Bankhead National Forest. Allison is also certified as an Associate Wildlife Biologist with The Wildlife Society.

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Date Signed ______________________________

REFERENCES

Alabama Inventory List – The Rare, Threatened and Endangered Plants, Animals and Natural Communities of Alabama. The Nature Conservancy, Alabama Natural Heritage Program, June 2001.

Biological Evaluation for Regional Forester's Sensitive Species and Locally Rare Species: Nantahala and Pisgah Plan Amendment #10, National Forests in North Carolina, by Steven A. Simon. July 2000.

Biological Evaluation: Suppression of the Southern Pine Beetle Infestation On the Nantahala and Pisgah National Forests, by Sandy Florence, Grandfather Ranger District, Nebo, North Carolina.

Biological Opinion on Impacts of Forest Management Activities to Indiana and Gray Bats on the National Forests in Alabama, by Lori M. Wilson, Ecological Services Field Office, Daphne, Alabama. December 1999.

Case, F.W. and R.B. Case. 1997. Trilliums. Timber Press. Portland, Oregon. 285 pps.

Challenge Cost Share Agreement #01-CCS-98-006. An inventory of freshwater mussels and the flattened musk turtle (Sternotherus depressus) in selected streams of William B. Bankhead National Forest, Winston County, Alabama. November 5, 1999. Gregory M. Lein, Natural Heritage Section, State Lands Division, Alabama Department of Conservation and Natural Resources.

Conversation with Dr. Merlin Tuttle, Executive Director of Bat Conservation International. April 1, 2001, Lexington, Kentucky.

Conversation with Paul Hartfield, Fish and Wildlife Service, Threatened and Endangered Species Office, Jackson, Mississippi.

Conversation with Ralph Costa, Red-Cockaded Woodpecker Coordinator for U.S. Fish and Wildlife Service, Clemson University, Clemson South Carolina.

Final Rule: Endangered and Threatened wildlife and Plants; Endangered Status for Eight Freshwater Mussels and Threatened Status for Three Freshwater Mussels in the Mobile River Drainage. March 17, 1993. Department of the Interior, United States Fish and Wildlife Service.

Final Report of the Black Warrior Waterdog Status Survey. Project E-1 Alabama Natural Heritage Program, September 30, 1992. Mark A. Bailey.

Harris, S.C., P.E. O'Neil, and P.K. Lago. 1991. Caddisflies of Alabama. Geological Survey of Alabama, Biological Resources Division. Tuscaloosa, Alabama. 442 pps.

Harvey, M.J., J.S. Altenbach, and T.L. Best. 1999. Bats of the United States. Arkansas Game and Fish Commission. 63 pp.

Huntley, J. C. 1995. Biological Evaluation for Amendment Number 14, New SMZ Standards to National Forests in Alabama Land and Resource Management Plan. USDA Forest Service. 22 pp.

Lellinger, D.B. 1985. A Field Manual of the Ferns and Fern-Allies of the United States and Canada. Smithsonian Institution Press. Washington, D.C. 389 pps.

McGregor, S.W. 1992. A Mussel Survey of the Streams Draining Bankhead National Forest and the Oakmulgee Division of the Talladega National Forest, Alabama. Geological Survey of Alabama. Tuscaloosa, Alabama. 29 pps.

Mettee, M.F., P.E. O'Neil, and J.M. Pierson. 1996. Fishes of Alabama and the Mobile Basin. Oxmoor House, Birmingham, Alabama.

Mount, R.H. 1975. The Reptiles and Amphibians of Alabama. University of Alabama Press, Tuscaloosa, Alabama. pp. 306-308.

Mussels That Matter. US Geological Survey leaflet. USGS, Biological Resources Division. May 1998.

Pierson, E.D. 1998. Tall Trees, Deep Holes, and Scarred Landscapes: Conservation Biology of North American Bats. *In* Bat Biology and Conservation, T.H. Kunz and P.A. Racey, eds., Smithsonian Institution, Washington. pp. 309-325.

Plants of Alabama. NatureServe web page. http://www.abi.org/nhp/us/al/plants.html

Preliminary Work on Maternity Colonies of Indiana Bats in Illinois. Timothy C. Carter, Steven K. Carroll and George A. Fieldhamer. A Symposium on The Indiana Bat: Biology and Management of an Endangered Species, Lexington, Kentucky, March 29, 2001.

Radford, A.E., H.E. Ahles, and C.R. Bell. 1968. Manual of the Vascular Flora of the Carolinas. University of North Carolina Press. Chapel Hill, North Carolina. 1183 pps.

Rickett, H.M. 1967. Wildflowers of the United States, Volume Two. McGraw-Hill Book Company. New York. 688 pps.

Roost Tree Use By Indiana Bats and Northern Bats in the Wayne National Forest, Ohio. Department of Biological Sciences, Eastern Kentucky University, Katrina Schultes and Charles Elliott. A Symposium on The Indiana Bat: Biology and Management of an Endangered Species, Lexington, Kentucky, March 29, 2001.

Roost Site Fidelity by Indiana Bats in Kentucky. Mark W. Gumbert, J.M. O'Keefe, and J. R. MacGregor. A Symposium on The Indiana Bat: Biology and Management of an Endangered Species, Lexington, Kentucky, March 29, 2001.

Shephard, O'Neil, McGregor and Henderson. Source: Biomonitoring in the Mulberry Fork Watershed, 1999-2001.

Source: Habitat Associations with Upland Stream Fish Communities in Bankhead National Forest, Alabama. Powers, Jones, Redinger and Mayden of the University of Alabama, June 2001

Southern Region Sensitive Species Revision, Forest Service Regional Database. January 2002.

Species Accounts of all listed species: Endangered and Threatened Species of the Southeastern United States (Red Book).

Species Profile for federally listed clams. U.S. Fish and Wildlife Service Division of Endangered Species homepage. http://ecos.fws.gov/species_profile/species_profile.html

Species Profile for federally listed plants. U.S. Fish and Wildlife Service Threatened and Endangered Species homepage. http://endangered.fws.gov/i/q.html

Status survey for Mussels in the Tributaries of the Black Warrior River, Alabama. 1990. Paul D. Hartfield, U.S. Fish and Wildlife Service.

Threatened and Endangered Species Listing by State and Territory, updated December 08, 2000. Fish and Wildlife Service Threatened and Endangered Wildlife and Plants web page. http://ecos.fws.gov/webpage/webpage_usa_lists.html

USDA Forest Service. 1994. Management Standards for Streamside Management Zones. National Forests in Alabama. 8 pp.

USDA Forest Service. 2002. Southern Region Sensitive Species Revision, Forest Service Regional Database.

Wilson, L.A. 1995. The Land Manager's Guide to the Amphibians and Reptiles of the South. The Nature Conservancy, Southeastern Region. Chapel Hill, North Carolina. 360 pps.

Comment Letters Received